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Settling the New Zealand Hinterland

The

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WELLINGTON, NEW ZEALAND,

20TH MAY, 1915.

HORSES FOR MILITARY PURPOSES.

C. J. REAKES, D.V.Sc., M.R.C.V.S.

A FACT which has been demonstrated as a result of the military activity lately displayed in New Zealand is that there is a larger number of sound, useful horses in the Dominion than had been thought to be the case. The official census of horses is only taken once in five years, and as the last enumeration made was in 1911 no recent figures were available. Moreover, the various headings under which horses were classified in the official tables were not very helpful in enabling a reliable estimate to be formed as to the number of horses available of types suitable for military work, though for general statistical purposes under peace conditions they were quite good enough. The opinion was held officially that there was a good supply of animals suitable for mounted regiments, but

that the number available for purchase for artillery and transport work was a doubtful quantity, and this element of doubt was heightened by the knowledge that within the last few years, when a few horses were needed for permanent artillery, some difficulty was experienced in obtaining animals of the exact type required. Hence when it became necessary to secure horses for artillery and transport work within a very limited time no risks were taken. The aid of the Farmers' Union was sought and enthusiastically given, with the result that all the horses needed were obtained within the given time; and, what is better, when obtained they were a very useful lot, though the general standard of quality of those of the lighter type could have been improved upon had more time been available, with consequent better opportunities for careful selection.

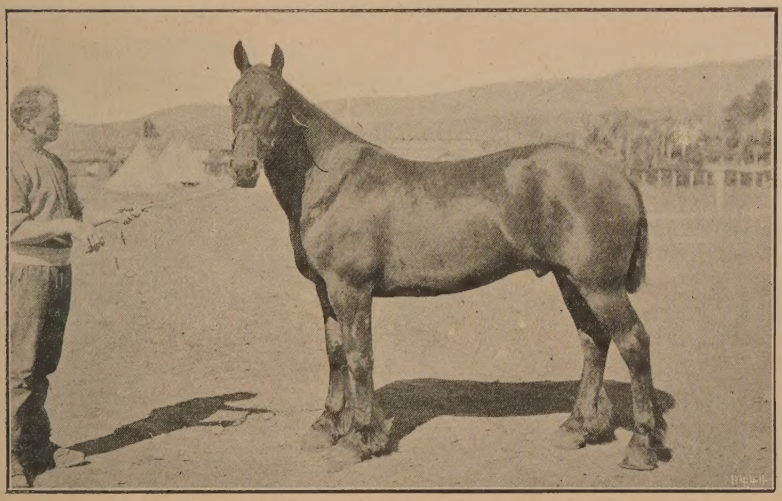
Since the main Expeditionary Force was despatched three other shipments of horses have been made, and now a fourth is being provided for. Yet no difficulty is being experienced in obtaining horses of the right type without any advance in price, and those purchased of late have been of a generally higher average quality than those first despatched. And, further, during the last four months purchasing officers have largely refrained from buying good mares of a type useful for breeding purposes.

The classes of horses required were—(1) Good weight-carrying hacks, from 14·3 to 15·2 hands in height, for mounted regiments; (2) from one-third to one-half draughts, active and of good conformation, for artillery purposes; (3) from half to nearly full draughts, for transport work; (4) strongly built, compact, low-set horses, for pack work. Some type are shown in the various illustrations accompanying this article.

In selecting horses for service in mounted-rifle regiments consideration had to be given to the character of the work which would be required of them. In the South African War the type of horse most favoured was the strongly built, active cob from 14·2 to 15 hands in height. The present European conflict is being fought under entirely different conditions, and a class of horses well suited to these conditions is an animal of the cavalry type, showing quality, with good bone, up to weight, and preferably from 15 to 15·2 hands in height, though good sorts of from 14·3 to 15 hands are extremely useful, and some of these have been bought.

Horses of most divergent types have been brought forward on offer to purchasing officers, and our experience of late has still further demonstrated the fact that horse-breeding here has for

years been carried out in too much of a haphazard and unsystematic manner. Certainly the farmers of the Dominion have not much choice in the matter of breeds when selecting sires to put to their mares, they being principally limited to the thoroughbred, the Clydesdale, and the trotter; and especially the fact that no outside market for military horses has been available has prevented any general action being taken in the direction of breeding on special lines. It is hoped that one result of our present military activity will be the exercise of more care and thought in horse-breeding. This applies more particularly to the breeding of hacks. The artillery and transport horses have shown, in some respects,

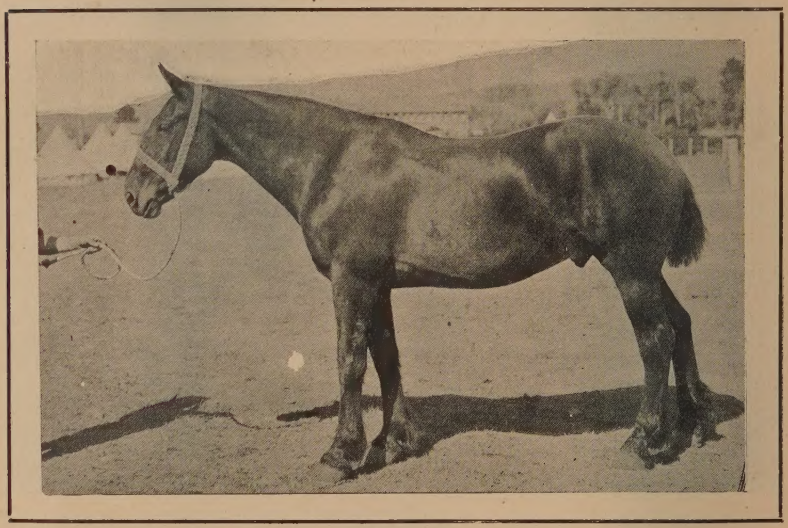


PACKHORSE.

much more uniformity of type and quality, the main points of difference in individuals being the relative predominance of the characteristics of the thoroughbred or the Clydesdale. Those which, while possessing the weight and substance desired from the Clydesdale blood, have shown in a marked degree the courage and quality desired from the thoroughbred strain have proved most suitable. Others, while being good useful sorts, have been too "carty" in appearance, and their consequent lack of symmetry has proved prejudicial, though it is quite possible that they would do as good work as their better-proportioned brethren; but from the point of view of a possible outside market they would be less saleable.

BREEDING METHODS.

In dealing with the question of breeding horses for military purposes, the methods to be recommended must necessarily be considered from the point of view of the class of breeding-stock available in the country. No breeding methods can be of any real value unless they are based upon the use of purebred stock on one side at least; and here we have practically to depend upon the thoroughbred and the Clydesdale, both of which breeds are well represented in New Zealand. Trotting blood has obtained a strong foothold in the Dominion, but, whatever its merits may



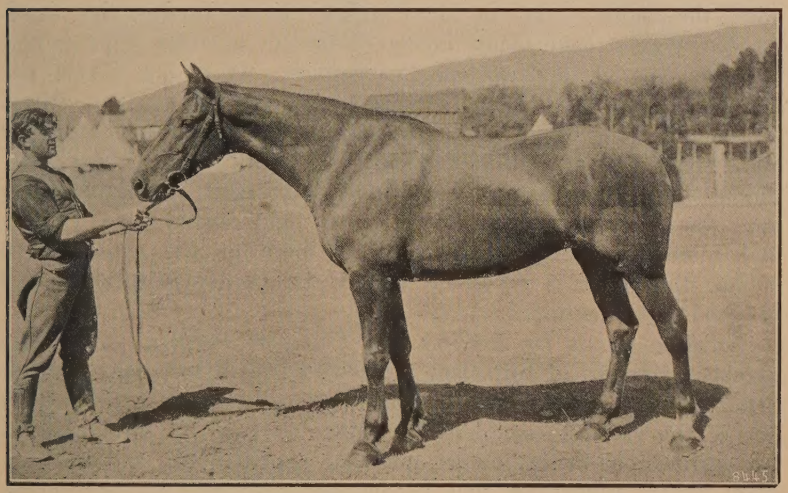
A USEFUL TYPE OF ARTILLERY HORSE.

be for the particular purposes which have conduced to its establishment here, it is not desirable for military purposes.

The majority of the horses secured for the New Zealand Forces during the present war have been bred by farmers on small holdings, and it is evident, and rightly so, that we must look largely to these farmers for the provision of our future military horse-supplies. The mares available for breeding purposes are mostly animals possessing thoroughbred and Clydesdale blood in varying proportions, often with an infusion of trotting blood, this being especially the case in the South Island. The so-called "spring-carter," possessing from one-half to one-fourth draught blood, has been a very saleable animal of late years, and consequently a good number

of mares of this class are in the country. And, still better, from the point of view of horse-breeding generally, we have good, clean-bred thoroughbred and Clydesdale mares. With these classes of mares available, and with thoroughbred and Clydesdale sires to mate with them, the following suggestions will be found useful to farmers who intend, as all farmers should do, to take military necessities into consideration, while at the same time carrying out horse-breeding methods which will produce saleable stock under peace conditions.

Breeding Horses for Mounted Regiments.—The sire should be a muscular, good-boned, sound thoroughbred, preferably one who



HORSE FOR MOUNTED REGIMENT.

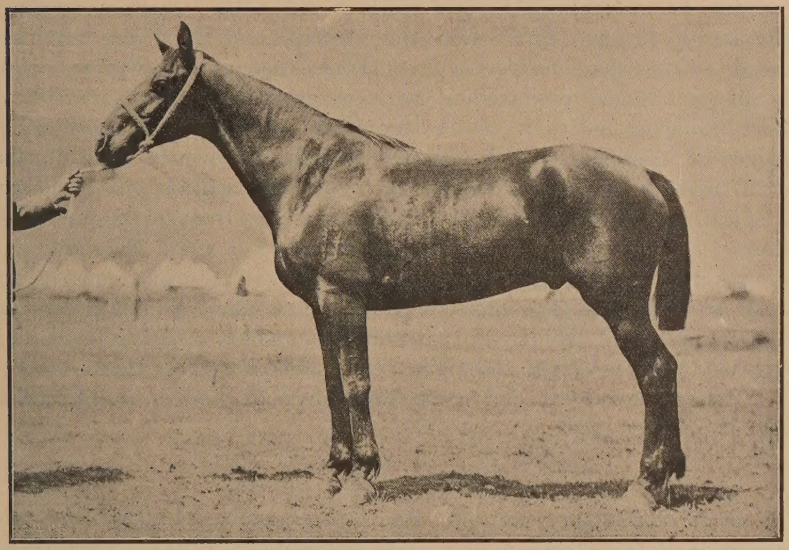
during his racing career has proved himself a good stayer, and a good weight-carrier in long-distance races. Essential points in conformation are a good shoulder, short back, strong loin, good hocks, and sound, well-formed feet. A height of not more than 15·3 is preferable.

Dam: A sound, roomy, active mare, showing not more than one-third Clydesdale blood, the rest thoroughbred, with the thoroughbred characteristics prominent throughout.

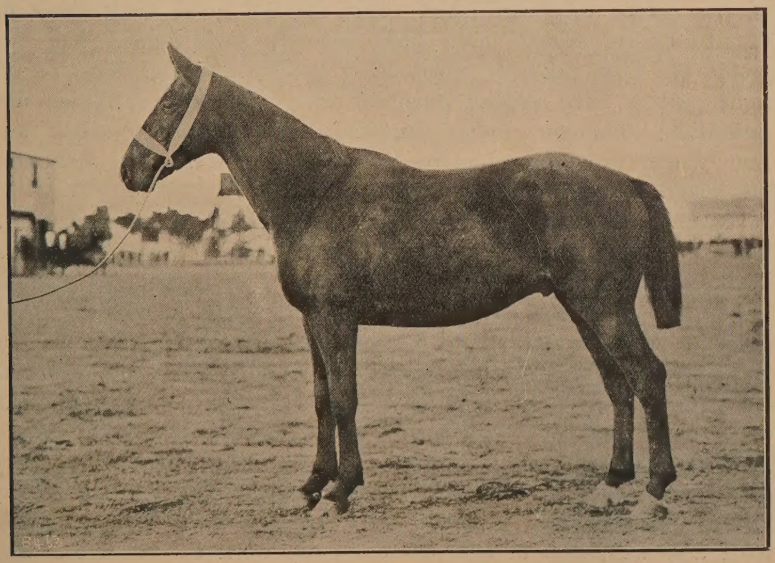
Naturally, knowing the varying proportions of light and draught blood in the very large number of crossbred mares in the country, only a percentage of those which will be bred from will closely conform to this type, but the nearer the breeder can get to it

the better is likely to be the progeny. Mares with less draught blood will produce useful horses, and a half-bred thoroughbred and Clydesdale mare put to the right sort of thoroughbred stallion will be likely to produce a weight-carrying hack; but a proportion of the stock so bred may be "carty" in appearance, though good for plenty of useful work. A clean-bred thoroughbred, if strongly built and good-boned, would make a good remount; but few farmers on small holdings own thoroughbred mares, and it is upon the useful crossbred farm mare, possessing a predominance of thoroughbred blood, that we are compelled to depend as the foundation of our future breeding methods, so far as military horses are concerned. But it is essential that she be always mated with the right stamp of thoroughbred sire. During the South African War strongly built low-set horses of a cobby type proved extremely useful, and, for producing these, upstanding Welsh cob stallions would be valuable. Such horses are still of value from a military point of view, for they are usually hardy, possessed of good constitutions, and fit for plenty of work under adverse conditions. But the class of horse found to be most serviceable under later war conditions is that known as the light cavalry type, a faster and more upstanding horse, showing more of the thoroughbred stamp, though it is necessary that it be good-constitutioned and of good conformation.

Breeding Horses for Artillery and Transport Purposes.—A smaller number of horses of this class are required than for mounted regiments, but at the same time mobile artillery has proved itself one of the greatest essentials in modern warfare. A straight cross between a good-boned, low-set, muscular thoroughbred and a clean-bred, active Clydesdale will produce a good field-artillery horse. Here again the point crops up that few small farmers possess thoroughbred mares which they could mate with Clydesdale stallions; while, on the other hand, those who own Clydesdale mares can obtain more saleable progeny by mating them with Clydesdale stallions than by using the thoroughbred. But there are plenty of mares in the country which, while not being of clean thoroughbred breeding, yet do not possess a large proportion of draught blood. These put to a Clydesdale stallion will be likely to produce stock useful for artillery purposes, or, if too heavy for that, they will still be of value for transport. And good transport horses—three-quarter draughts or thereabouts—are still a necessity to an army on active service, in spite of the large use made of motor traction. Again, there are many mares not quite clean-bred Clydesdales, yet with the draught type strongly predominating, which if put to a strongly built thoroughbred horse will produce



HORSE FOR MOUNTED REGIMENT.



HORSE FOR MOUNTED REGIMENT.

stock useful for field-artillery work. Some variation in type is needed in making up a field-artillery team, the wheelers needing to be of heavier type than the leaders, and howitzer batteries need a somewhat heavier type of horse than is required for field artillery. Hence in breeding with a view to supplying artillery and transport horses it can be borne in mind that, though varying types of from half to three-quarter draughts (or even a few animals still heavier) may be produced, there are different classes of horses required, and consequently a likelihood of the stock produced being saleable. But it must always be borne in mind that military horses used for draught purposes, whether it be to pull guns or to pull transport-wagons, must be free, active movers, and possessed of courage and ability to withstand hardships. An infusion of thoroughbred blood of the right type is necessary for this.

Lastly, soundness and good constitutional power are essential in all breeding-stock.

CARRIAGE OF HORSES AT SEA.

It is satisfactory to note the success which attended the sea carriage of the horses of our main Expeditionary Force. Of three shipments which have reached their destination the percentage of loss has been respectively as follows: No. 1, 2 per cent.; No. 2, 1·7 per cent.; No. 3, 1·4 per cent. This reflects great credit upon the Veterinary Officers and others responsible for the care of the horses on board ship. But all the good work done on the transports would have been severely handicapped had not great care been taken to ensure that the horse-fittings were of the right pattern, that proper provision was made for ventilation and sanitation, that the forage supplied was of good quality, and that proper provision of stores for medical and surgical treatment was made.

In the matter of the fitting-up of the ships for horses, Lieut.-Colonel Clayton, N.Z.V.C., associated with Captain Post and Messrs. Walker and McPherson, of the Transport Board, rendered particularly good service, his ripe experience and sound knowledge of all matters connected with the transport of horses by sea proving of the greatest value. Major Reid, N.Z.V.C., undertook the responsibility of providing the necessary veterinary stores and equipment, and carried this out with great thoroughness. Mr. J. L. Bruce, Assistant Director of the Live-stock and Meat Division, rendered great assistance in connection with forage. In the preliminary camps Lieut.-Colonel Snowball and Lieut.-Colonel Lyons worked hard and well, and in addition did good work in connection with the purchase of horses.

HORSE AND FORAGE SUPPLIES.

The bulk of the work of obtaining the horses required (apart from those brought to camps by troopers) was entrusted to a number of the Inspectors of Stock throughout the Dominion, and I must express my great appreciation of the good work done by them, and also by Mr. A. H. Bill, of Marton, who patriotically offered his services to the Government and rendered valuable aid. The work of these purchasing officers was greatly facilitated by the assistance rendered by several auctioneers and stock-agency firms in the various districts; and in this matter I would, while fully appreciating the good work done by all, particularly express my appreciation of the valuable aid gratuitously rendered by Messrs. Wright, Stephenson, and Co., of Dunedin and Invercargill, and the Farmers' Auctioneering Company, of Hamilton.

In the matter of forage-supplies the farmers of the Dominion acted in a most patriotic way, large quantities being donated. The handling of all this was undertaken free of charge by the New Zealand Farmers' Distributing Company, of Wellington, and hearty thanks are due to this company and to Mr. Leigh Hunt, its manager, for the valuable assistance rendered.

By no means had all the horses to be purchased by the Government buyers. Many good horses were presented by individual citizens, and many others were purchased and presented by patriotic committees formed in various districts, the Dominion thus receiving material aid in carrying out its share of the Empire's work in the great struggle now in progress.

NEW ZEALAND MOUNTED MEN IN EGYPT.

WHAT IS IT THAT YOUR SOIL LACKS?

G. DE S. BAYLIS.

THERE are many farmers who for various reasons are desirous of learning by observation something about the best method of treatment of their particular soil, and yet may not be in a position to carry out a co-operative experiment therewith, or may desire to utilize somewhat larger areas than are usually undertaken under the co-operative experiment system.

If every farmer made a practice of fencing in, say, 6 or 10 acres of land and dividing this into two equal paddocks, using one for the new method and one for the old method, he would have a handy experimental area off which he would be able to glean much useful information, while it would also grow a crop of sufficient bulk to repay all expenditure incurred and return a profit upon the outlay. If such plots were established on frontages to public roads, the farmer, while benefiting himself, would also be helping to promote the development of his district, and while others obtained hints from his plot he would likewise benefit by observing theirs.

Such a system is also a cheap and easy way to arrive at the probable cost of, and return produced, per acre, by the system adopted, and enables the farmer to estimate with a fair degree of accuracy the cost of working the larger paddocks of the farm upon a similar system, and the proportional increase in production likely to be derivable therefrom.

It is not intended to suggest that the average farmer has time, or in many cases possesses the trained observation necessary, for the conduct of intricate experiments. On the other hand, there are many simple questions which the farmer could put to his soil, and which in a large number of cases would be answered by the soil in a manner which would leave little doubt as to its meaning, for the answer would be a visible one. If, then, the farmer knows the cost of the work done and material used on the 3 acres of land under the new method, the number of bags of chaff cut, or stock carried, as the case might be, he knows all that is necessary to enable him to compare it with the 3 acres on the other side of the fence which has been cultivated in the old manner.

New Zealand is a country which possesses soils, climates, and prevalent conditions in immense variety, and it follows that the

requirements and most suitable methods of treatment must therefore be just as numerous and varied.

In one type of soil alone there may be numerous errors and requirements to be adjusted before it can be made productive to any great extent. Another type of soil may be lacking in one thing only. At the same time there are certain wants possessed in common by a large number of the different types of soils existing. Prominent among these are *humus* and *lime*. It is such simple questions as these which the observant farmer who takes a little trouble can easily decide for himself by adopting the method herein suggested, and it is not exaggerating things to say that if the lands in New Zealand lacking in either or both of these essentials were located and the error adjusted, within a few years the production from these soils would be enormously increased.

Following are illustrations of the methods suggested :

EXPERIMENT I.—VALUE OF HUMUS.

1.	2.
3 acres Cow-grass (12 lb. to 18 lb. per acre).	3 acres Oats (2½ to 3 bushels per acre).

First Year.—Plot 1 is ploughed, harrowed, and rolled and sown in cow-grass, either in spring or autumn according to the general practice of the district. Plot 2 treated similarly and sown in oats.

Plot 1 is to be grazed, and record kept of the number of stock carried, and number of days for which grazed.

Plot 2 : Oats to be harvested, and record kept as to number of bags of chaff cut or bushels of oats threshed.

Second Year.—Plots 1 and 2 are both ploughed up, either in the spring or autumn according to the prevalent practice of the district. See that a good growth is ploughed under in plot 1. Both plots should be well rolled, and care taken in cultivation given to plot 1 not to disturb the buried vegetation. Both plots are then sown in oats under similar conditions, and records kept as to number of bags of chaff cut off each plot or number of bushels of oats threshed. In the autumn both plots might be sown in barley for winter feed if desired. Plot 2 should be grazed bare, but on plot 1 a fair amount of growth should be ploughed under.

Third Year.—Both plots to be sown in either swedes or turnips, rape, or kale, and record kept as to number of stock carried on each, and for how long.

It is a common practice in some districts to take two consecutive crops of oats off the same paddock. This experiment illustrates the value of increasing the humus-content in the soil, while the third year, when both paddocks are in swedes, should indicate the relative condition of fertility of each paddock. Due care must of course be taken in the proper preparation and firming of the seed-bed for each crop, or want of proper mechanical fitness of the soil may render the results negative.

If the soil will not grow a decent crop of cow-grass, green oats, barley, or rye-corn may be grown for winter grazing on plot 1, and a fair second growth of 10 in., or more if possible, ploughed under to a fair depth some little time previous to sowing the oat crop for chaff or seed purposes upon it.

EXPERIMENT 2.—VALUE OF LIME.

1.	2.
3 acres. No lime—only the usual artificial manures used as when sowing crop on plot 2.	3 acres. 1 ton f.g. limestone on light land per acre, or ground burnt lime on stiff heavy soil rich in organic matter.

Both plots are ploughed and cultivated in the same manner and at the same time. Apply the lime in the autumn. Sow both plots first year in oats with usual artificial manures. Keep records of yields obtained in the same manner as in experiment 1.

Second Year.—Both plots are sown in swedes or turnips, rape or kale, and record kept.

Third Year.—Both plots to be sown in peas, or oats and vetches, or cow-grass, and record kept.

On very light land deficient in organic matter sow the plots in swedes or turnips for the first year and oats for the second year; peas, or oats and vetches, or cow-grass for the third year. Make good use of the Cambridge roller before drilling in the seed of each crop sown on light soils.

On all occasions the same cultivation must be given and the same manure mixture used at the same rate per acre on both plots.

Should any North Island readers of the *Journal of Agriculture* decide to adopt the suggestions herein made, and to carry out one or other of the trials herein mentioned, I should be glad to get in communication with them, to afford them all the information within my power, and later on to hear the results of their experience.

STRENGTHENING A LUCERNE-FIELD.

T. W. LONSDALE.

It has been declared that lucerne-plants should never be interfered with when once they are established, but experience is proving that not only will the use of a weed-eradicator or cultivator—used with the object of destroying foreign growth—tearing and lacerating as it does the lucerne-plants, does no harm to the crop, but will, on the contrary, strengthen it. Not only this, but where the plants are not thriving, owing to the predominance of weeds, the use of the plough, either to completely turn over the sod or to skim the

NEW PLANTS FROM OLD PIECES OF DISSEVERED ROOTS.

surface, will, while cutting the lucerne-plants below the surface and apparently destroying them, actually bring about a more vigorous and profuse growth of lucerne. This has been the experience at Moumahaki. In one of the main lucerne-fields of the property—a very light soil in an exposed position—Yorkshire fog, cocksfoot, and weeds had established themselves among the lucerne-plants. A drastic remedy was suggested. Part of the area was ploughed to a depth of 6 in., another portion skim-ploughed, and a third bastard-ploughed—that is, the furrow was partially turned over by setting the plough to take too large a furrow. A portion of the field was disked, another portion was cultivated with a spring-tooth cultivator,

and the balance of the field was left untouched. An examination of the field at the present time is most interesting. Though this radical treatment was carried out only in May last and two good cuttings taken for hay this season, the general growth is excellent; but, strange to say, the rougher the treatment the better the present development and the cleaner the land. Where the plants were actually ploughed out there is now a much denser and better growth than before. If the crowns of the plants be examined it will be found that from dissevered pieces of the old root thrown to the bottom of the furrow, often upside down, two or three and even four strong young plants have sprung up. Accompanying illustrations testify to this. Where the field was untouched grasses and weeds are now struggling for possession with the lucerne-plants. Where the field was skim-ploughed, bastard-ploughed, and disked the improvement is satisfactory, but is not so great as the case with the more drastic treatment.

ANOTHER DISSEVERED ROOT THROWING UP FRESH PLANTS.

A study of this field certainly goes to prove that no one need despair if he find his lucerne becoming crushed out by other plants, for apparently any means he may take to get rid of the foreign growth will not kill out lucerne-plants which have been once well established. Indeed, lucerne apparently thrives under destructive treatment. It is always well, of course, to deal with weeds and undesirable plants before they have taken too strong a hold, especially if the lucerne has not long been established.

Cows bloating on Lucerne.—Many cases have been recorded this season of cows bloating on lucerne. In several instances the lucerne had been freshly cut and left in large heaps in the field. In other cases the lucerne had been cut the previous day, but it was still wet with a heavy night-dew when the cows were allowed to feed on it the next morning after milking. Bloating has also taken place in several localities through feeding cows on clover. These results were to be expected in a season like the past, of spare pastures and the cattle being given occasional large supplies of very succulent forage.

TWO WEEDS LITTLE UNDERSTOOD.

A. HUGHES.

HOARY CRESS *(LEPIDIUM DRABA).*

THIS weed is increasing very rapidly, and in some parts of North Canterbury I have seen paddocks of crops and grass nearly white when this was in full flower.

It is a native of Europe, Asia, and Africa; is a perennial, with deep-penetrating roots which contain much stored food. Pieces of the root will grow, as in the case of Californian thistle, twitch, &c.

It grows from 1 ft. to 3 ft. high; has oblong leaves, the lower stalked; the upper have an arrow-headed base which clasps the stem. The flowers are of a whitish colour, in short corymbose clusters somewhat like that of the carrot. Flowering occurs in October and November. The seed-pods are small, flattened, and heart-shaped, with one seed in each cell. It is a prolific seeder, and difficult to eradicate when once it is established. Summer fallowing, deep ploughing, and frequent stirrings are the best means of eradication. Cutting to prevent seeding and frequent hoeing will often give good results, and any roots thus brought to the surface should be burnt.

This weed, as I have already said, is becoming very prevalent, and requires far more attention than it is receiving. I have seen it cultivated in gardens and shrubberies.

ST. JOHN'S WORT *(HYPERICUM PERFORATUM).*

This is another of the "creeping weeds," is a perennial, and a native of Europe, Asia, and Africa. Erect stem, from 2 ft. to 3 ft. high; leaves oblong and about half an inch long, of a bluish-green tint; flowers bright yellow dotted with black, n terminal clusters, which when crushed stain the hand yellow.

The plant contains an oil of some slight medicinal value, but this oil and the woody nature of the plant renders it injurious in fodder.

It has deeply penetrating roots, and forms short runners, pieces of which if broken off will grow. It is most troublesome in

pasture land, as it attains such a height that it overtops all but the tallest and coarsest grasses.

This weed is not troublesome in England, as there it is not allowed to get established.

It being a perennial and spreading from the roots as well as seed, deep ploughing in a dry season, if followed by a potato crop, does not give the plant a chance to get away if the potatoes are kept as clean as they should be. A root crop may be required the following year before the land is safe for grain.

Since this plant is a heavy seeder, it must be cut down before the seeds are formed.

PENNYROYAL.

R. J. HAMILTON, M.A., B.Sc.

THIS is a most troublesome plant, and causes a great deal of loss to farmers. Several have asked through the *Journal of Agriculture* for information as to the best means of controlling it.

Some years ago I noticed, in passing a farmer's barn, that the pennyroyal had been killed where the farmer had thrown out some brine. I passed the same place a little later and found the grass had come up again round the edges which had received the smallest dressing of salt. The pennyroyal did not come up either that year or the next. I made several experiments and found that a light dressing of salt would check pennyroyal, whilst the grasses remained uninjured. I found, however, that different soils needed different quantities. Some years after this I went to a district where the pennyroyal was growing luxuriously on the cricket-ground. It cost £2 a year to keep it cut, and the result was not satisfactory. I obtained about 3½ cwt. of salt and applied it to the ground. The pennyroyal died down at once, and though the land was dressed some ten years ago the cricket-ground is still free of pennyroyal, while the surrounding paddock is covered with a thick mat of the plant. The weed has started to grow several times, but the cattle keep the ground so closely cropped that it has soon died out. I have used the salt to clear tennis-lawns and paths of this weed and have not had a failure.

A warning is, however, necessary. Too heavy a dressing will kill the grass as well as the pennyroyal. From 3 cwt. to 4 cwt. to the acre will be sufficient. Any one who wishes to use this remedy should experiment a little for himself.

CALIFORNIAN THISTLE.

S. M. TAYLOR.

IT having been declared in Southland that cutting the Californian thistle is of no avail, it may be pointed out that in the North Otago district repeated experience has demonstrated that this method of eradication is entirely successful. Even on farms of rich volcanic land, where the thistle has been cut every year just at the flowering stage, and where it was exceptionally bad five years ago, to-day a marked improvement is noticeable. In some paddocks the vitality of the thistle is so weakened where it has not been altogether destroyed that a few hours' work is now sufficient to deal with it, whereas it formerly took several days with the mower and horses. Take the far-famed Totara Estate. Here the thistle had a very strong hold, and the land being rich it was most difficult to deal with. Now, by repeated cutting the thistle has disappeared altogether in many places, while where it still persists it is so weak that its control is now quite an insignificant matter. A large number of North Otago farmers will bear me out that cutting the thistle every year when in the flowering stage has done marvels in the way of destroying acres upon acres of the weed in their district.

A NEW CLOVER.

AN interesting novelty in the plant-selection section of the Moumahaki Experimental Farm is a stoloniferous red clover. This is the development of a plant discovered in the Auckland Domain by Mr. J. Beveridge, the Assistant Plant-breeding Officer at Moumahaki. As far as can be ascertained this is the first instance which has been noted of a clover-plant extending itself by underground stolons—that is, similar to the manner in which *Poa pratensis* spreads itself—and therefore it may be regarded as an absolutely new type. At the present time the plant is being seeded in order to ascertain if it will transmit the new character from seed. Should this prove to be the case the type will be a valuable addition to the clover family. It would probably be of special value on lighter soils and in sandy country.

SOYA BEANS.

A. W. GREEN.

In the nursery of the Ruakura Farm of Instruction tests of new varieties of Soya beans have been conducted this season. The most striking feature of the tests was that where inoculated soil had been used there was exceptional nodule-development on the roots of the plants, though accompanying this there was no difference in the development of the plants from those grown on soil which had not been inoculated. Seed saved from a plant showing heavy nodule-development, this having been grown in inoculated soil, and the seed sown in an area where no inoculated soil had been applied led to no development of nodules on the roots of the resulting plants.

The varieties under test conveyed many other instructive lessons, the most interesting of which was the great difference between early- and late-maturing varieties. The first two varieties shown on the left-hand side of the picture on the opposite page had been, at the time of writing (22nd April), threshed, while the variety on the extreme right, now in full growth, has only commenced to form seed-pods. Again, the larger-growing varieties, as far as size of plant and leafage is concerned, show the least development of seed-pods. This indicates that the varieties exhibiting a great wealth of leafage are the most unsatisfactory to grow for the production of a bean for commercial purposes. On the other hand, these larger-growing varieties are apparently more suitable where feeding-off is the objective. In this connection it may be remarked that stock are not apparently partial to the Soya bean as a forage plant.

The characteristics of some varieties are very distinctive. No. 54, sown on the 13th November, had reached a height of 4 ft. on the 22nd April; yet it had scarcely any development of seed-pods. Another plot of Brown Soya bean reached an average height of 9 ft. 1 in., and, though sown on the 23rd December, it had on the 22nd April a heavy crop of beans almost ready for harvesting. This gave the heaviest crop. Some varieties sown on the same date had not even developed flowers.

The editor of the *Journal of Agriculture* for the past four years, Mr. C. E. Cuming, has resigned his position in the Department to take up the editorship of the *New Zealand Farmer*.

THE SOYA-BEAN PLOTS AT RUAKURA FARM OF INSTRUCTION.

GREEN-MANURING.

R. E. FAIRFAX-CHOLMELEY.

In New Zealand, where there is little or no farmyard manure, the value of green-manuring cannot be overestimated. The providing of organic matter should be one of the first considerations of the farmer. In most cases it is to the lack of humus that lower yields of crops can be attributed.

By using a suitable rotation of crops, green-manuring, feeding off the crops of the farm, liming, and the addition of phosphates the land should be in as good, if not better, heart than when cropping commenced, instead of being worked out at the end of a few years, as many farms have been in the past.

No matter what the nature of the soil may be, the wonderful effect of green-manuring is surprising. On the sandy and light lands, by the addition of the organic matter which produces humus, the small particles are bound together, which helps to retain the moisture, while in strong clay lands the character of the soil is changed by the breaking-up of the particles, rendering the land more porous and pliable.

If legumes are used for green-manuring, in addition to the organic matter, nitrogen, one of the essentials of plant-life and the most expensive manure to buy, is added to the soil.

Clovers of all kinds are great soil-improvers. The red clovers are excellent crops for ploughing in, and have this advantage: that, although the best results will be obtained by ploughing the crop in, very good results will be secured if a crop of hay is taken off and the aftermath ploughed in or eaten down by sheep. This will bring some return for the outlay, thus lessening the cost.

An experiment at Rothamsted showed that after a crop of hay had been taken off a plot of clover, the following year 50 per cent. more grain was taken off this plot than off the adjoining one.

In sandy and light lands the annual lupin does not receive the attention it deserves. It is a very fast grower, yields a heavy quantity of organic matter, and is a powerful means of collecting

and storing nitrogen. In Great Britain the blue lupin is considered the best, but in New Zealand so far the white has proved superior. Three small plots of annual lupin, blue, yellow, and white, were grown at the demonstration plots, Auckland Exhibition. The white gave the best results. The crop was ready to plough in six weeks after sowing. Sixty-eight days after sowing the yield worked out at the rate of 25½ tons per acre for green-manuring purposes, and the roots were rich in nitrogenous nodules.

Many other legumes, such as peas and tares, are excellent crops for green-manuring, but the seed is too expensive to allow the crop to be grown to plough in; nevertheless they improve the soil, adding nitrogen and a certain amount of organic matter in their roots when these are ploughed in.

Lotus major, *Lotus corniculatus*, and *Lotus angustissimus* are being grown on the gum lands, and have improved these considerably, but are hardly suitable for growing as green-manuring crops, occupying the land too long before coming to maturity. Serradella in the north, where the frosts are not severe, is worth growing. It can be sown in the autumn, and gives a fair yield.

Of the non-nitrogenous plants, mustard is one of the best to grow. It stores a large amount of nitrogen, but it has yet to be proved that it gathers it from the air; it gives a heavy yield and grows fast, but does not stand the frost well.

Oats also are a good crop for ploughing in.

If the improvement of the farm is to be considered as it should be, the farmer will find that green-manuring is of the first importance, and the use of red clovers for this purpose will greatly assist him. Probably he will obtain the greatest results at the least cost by using red clovers.

The Manager of the Moumahaki Experimental Farm attributes the increased fertility of the soil of that farm largely to green-manuring and a judicious rotation of crops.

OVER-GRAFTING.

A. W. GREEN.

THE fruitgrower who has a variety of apple-tree subject to woolly aphis may easily replace it by grafting over with a resistant variety. This may be necessary where in the first case the tree has not been worked on to a blight-proof root or where the stock is not blight-proof. In the accompanying picture, taken at the Ruakura Farm of Instruction, a demonstration is provided how a blighting variety — in this instance Jeffries — has been grafted over by a blight-proof variety, Willie Sharp. In the illustration the aphis is shown to be attacking the old stock, but is not coming above the union of the graft. This method is a very much quicker means of replacing fruiting-trees than that of taking the stocks out and replanting with young trees. In this case it was not possible — but in some cases it is possible — where the first graft has been put on high, to cut the tree down below the first graft so that the new variety unites direct to the blight-proof stock. If this can be done a decided advantage is gained. A little care is necessary during the first season after grafting the tree, particularly in regard to the thinning-out of the centre, otherwise the branches are apt to grow too close together. It may be well to mention that nursery-

men when raising apple-trees graft the named variety on to the blight-proof stocks, usually Northern Spy. By so doing they eliminate all chances of woolly aphis attacking the roots of the tree. Therefore if the branches and trunk of a tree are badly blighted it does not mean that the root is affected also and should be dug out. Make use of the root so long as it is healthy and vigorous.

SWEET CLOVER (MELILOTUS ALBA).

R. E. FAIRFAX-CHOLMELEY.

MELILOTUS ALBA, generally known as "sweet clover," or "Bokhara clover," although there are many other names under which it is known, is a plant widely distributed throughout Europe and America, and up to within the last few years has been generally looked upon as a weed.

Professor L. H. Bailey, in his well-known work "Cyclopedia of American Agriculture," describes both *Melilotus alba* and *Melilotus officinalis* as being regarded as weeds in most parts of America. Professor Bailey is not alone in his opinion. Nearly all writers in the past have condemned it as being unpalatable to stock, owing to its containing cumarin, which gives it a pleasant odour when bruised but a bitter taste, thus rendering it unsuitable for grazing, as stock generally reject it until they have become accustomed to it. Both as a soil-improver and for green-manuring its merits have been recognized, it being especially useful on poor sandy lands and worn-out pastures.

Melilotus alba and *Melilotus officinalis* grow wild in New Zealand. Mr. E. Clifton, late Director of Experimental Farms in New Zealand, in giving information to the Ohio Experimental Station, writes, "Both species are common in New Zealand, and have been tried in an experimental way. They are quite neglected by stock."

My own limited experience agrees with this opinion. It may be noted that when found growing on roadsides these plants are neglected by stock. It is therefore of interest to record that Mr. E. Griffith, of New Plymouth, is growing both *Melilotus alba* and *Melilotus officinalis* as food for cows on his Jersey farm at Bell Block. A load of *Melilotus alba* is cut and carted to the cows

every day, and is eaten readily by them. The cows appear to appreciate it, and are doing well.

Professor Henry, in his "Feeds and Feeding," gives the following analysis of dry and fresh material:—

	Dry Matter in 100lb.	Digestible Nutriment in 100lb.			Fertilizer Constituents in 100lb.		
		Crude Protein.	Carbo-hydrates.	Fat.	Nitro.	Phos.	Potash.
Sweet-clover hay ..	92·1	11·9	36·7	0·5	78·8	5·6	18·3
Fresh sweet clover..	20·0	2·5	8·4	0·4	6·1	2·4	6·7

Of this fodder, *Melilotus alba*, Mr. Griffith speaks very highly, and intends to grow further crops, but *Melilotus officinalis* has not been a success. The Ohio Agricultural Experimental Station has taken up this subject, and Mr. W. A. Lloyd has made extensive investigations, the records of which are published in Bulletin 244 of June, 1912. As shown in this bulletin, there exists amongst farmers and others a great diversity of opinion, but the majority are favourable, and there is strong enough evidence to justify further trials as to the suitability or otherwise of this fodder in New Zealand, more especially as Mr. Griffith has been so successful. After carefully perusing the above-mentioned bulletin, one cannot help being impressed with the possibilities of *Melilotus alba* as a fodder for stock in this country.

Mr. N. Schmitz, the Agronomist of the Maryland Experimental Station, in his report, says, "The strange thing with this plant, to me, is that while all stock will relish it in this section of the country just mentioned (referring to Mississippi, Alabama, Kentucky), here in Maryland and in the northern States it is only under starving conditions that stock will make any attempt to eat it."

There is another case of the effect of environment, and for this reason care should be exercised in growing it; there being the possibility of introducing into parts of New Zealand a plant that may prove to be an objectionable weed, more especially as the variation of soil and climate is so great.

Judging by Mr. Griffith's crop, there is little difficulty in growing *Melilotus alba*, which gives a heavy yield. It is a biennial; the stalks are coarse; it makes good ensilage, but it cannot be recommended as a hay crop, owing to the difficulty of saving it without losing the greater portion of the leaves.

As previously stated, it is excellent as a soil-improver. The roots carry the same bacteria as lucerne, and can be grown with

the object of inoculating the land with bacteria before planting lucerne. Some writers state that if it gets into a lucerne crop it is hard to eradicate. There is conflicting evidence as to its tainting milk. The plant should be cut early, as the stems turn prematurely into wood.

It is cultivated in France as a textile plant, the fibre being manufactured into common cloth. In the Le Baron district of Syria it is grown to make pipe-stems; while the Chinese in the vicinity of Hunkow use it as a vegetable. When properly cooked it is said to resemble spinach. It would therefore appear to be a plant of many uses, distributed over the greater part of the globe. The famous Gruyère cheese of Switzerland is said to owe its flavour to *Melilotus officinalis*.

The further experiments of Mr. Griffith in the use of *Melilotus alba* as a fodder plant for cows and the suitability or otherwise of its use as a pasture will be looked forward to with interest. So far the yield has been in excess of any crop I have seen growing in the district, and Mr. Griffith is greatly pleased with the result.

NOTE BY THE BIOLOGIST.

A FACT which has lately come under my notice very markedly is that on many roadsides *Melilotus arvensis*, the introduced species common to New Zealand, appears to have been eaten down quite close to the ground during the past dry season. This is very different from the common experience of past seasons, when it has been completely neglected by stock. Could stock be made to relish the various species of *Melilotus*, the growing of these as the clover-constituents of many pastures would be a sound economical proposition. More information is necessary before the plant can be recommended. The point worthy of consideration is that the much-boomed plant "King Island clover" is a species of *Melilotus*. It is, in fact, declared that *Melilotus* has made King Island one of the most fertile spots of the Tasmanian littoral. On the other hand, this plant is roundly condemned as a useless weed by nearly all Australian farmers. The question of the effects of environment emphasized by Mr. Fairfax-Cholmeley is probably responsible for the apparent erratic behaviour of members of the *Melilotus* family and the conflicting evidence we have regarding their value as forage crops.—*A. H. Cockayne.*

GLASSHOUSE-CONSTRUCTION.

S. F. ANDERSON.

THE yearly increase in the number of buildings being put up for the growth of grapes and tomatoes throughout the Dominion calls for the careful consideration of the best methods and the use of the best material. There are numbers of houses where good timber has been used, the rafters, ridge-boards, ventilators, and doors being in good condition after forty years or more, even where very little paint has been used. Coming to the top and bottom wall-plates, studs, and blocks—parts that become so often alternately wet and dry—here we have decay, and consequently a settling or sagging of the roof, this breaking the glass and causing much water to drip through. Had the walls been built of concrete or brick, all they would require to make them last many years longer would be a renewal of the top-plate and a thorough cleaning and painting of the woodwork. There are a few instances of houses being built entirely of iron and concrete — T iron for rafters and ends, angle iron for supports and bracing, and sheet-iron ventilators. These make very neat, permanent structures, with the minimum of shade inside. Personally, I am not in favour of iron rafters and sashes. For supports and braces they are the best, but I consider the wooden sash-bar rafter best for the roof. It is certain that for glazing and any renewal of the glass and for a general tight roof and top ventilation the wooden-framed roof still holds first place in our commercial plant-houses.

The high price of good timber, its limit of standing the damp conditions of a plant-house, and the effect of the soil are, when this material is compared with concrete or brickwork, all in favour of the use of these latter. Some suggestions in regard to the erection of concrete walls for glass buildings are here submitted.

It is assumed that before proceeding to the erection of the house the ground set apart for the inner area, and also for a margin for outdoor borders, has been prepared by trenching at least 2 ft. deep and by replacing unsuitable clay or other material with good. The method of doing this and the materials recom-

mended are given in Bulletin No. 40 (new series), "The Cultivation of the Vine under Glass." For economy of working and for maintaining an even temperature a good-sized house is recommended. One 102 ft. long and 30 ft. wide, with 3 ft. side walls, inside measurements, and a pitch in the roof of 40°, is suggested.

It is much the better plan to have a good tradesman to do the work. Although very good work has been done by amateurs it is a risk; and more than one of these has said, "Well, if I had that job to be done over again I would get a tradesman to do it." Making the moulds and getting the perfect squares and levels of the walls, fixing door-jambs and rafters, and finishing off the top wall to provide guttering, &c., are beyond most amateurs.

In the case of the cool vinehouse it has been recommended that the vines be planted outside. Provision must therefore be made for bringing them inside when ready.

SPECIFICATION OF WORK AND MATERIAL.

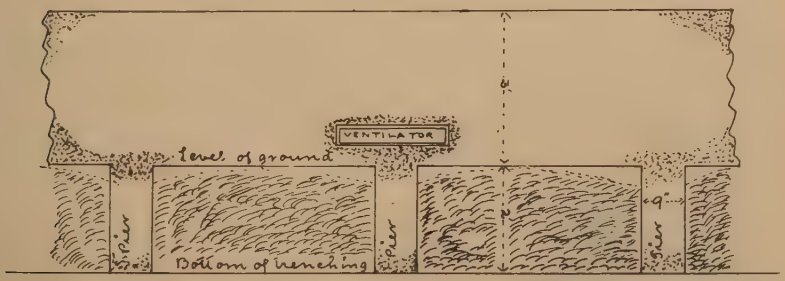
Side walls, each 103⅓ ft. long, outside measurement.

End walls, each 30 ft. long, inside measurement, less openings for doorway at each end.

Height of side walls from ground-level, 3 ft.

Thickness of walls, 8 in.

Piers of concrete or brick, 9 in. by 9 in. by 24 in., to rest on the unbroken subsoil bottom. One pier to every 5 ft., centre to centre. This to provide space for vine-roots to extend inside and out of the vine-borders. (See sketch.)

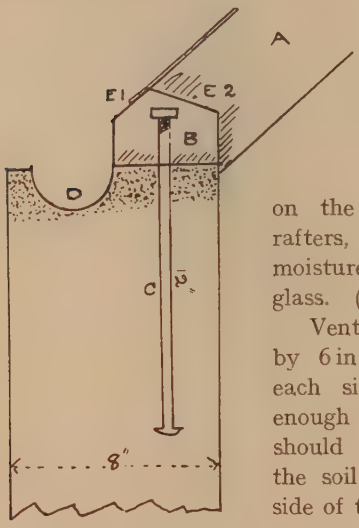


SECTION OF SIDE OF WALL SHOWING PLACING OF PIERS IN THE TRENCHED GROUND. THE SPAN OF WALL MAY BE STRAIGHT OR ARCHED AS SHOWN BY THE DOTTED LINE.

The walls to span from pier to pier horizontal or arched, but top of arch not to come above general level of ground.

Corners of building to be solid to the bottom of the trenched ground for a distance of 3 ft. under both walls.

Walls all round to be reinforced with barbed wire, which should be carried round corners. The top of the wall to be finished off on the outer edge with guttering in the concrete, and on the inner side by 5 in. by 3 in. totara top-plate. This top-plate to be held in position by bolts sunk in the walls, the top ends to be screwed with nuts countersunk in the plate. The top-plate to be bevelled on the outside to suit the slope of the rafters, and on the inside to throw off any moisture that comes down the inside of the glass. (See sketch.)



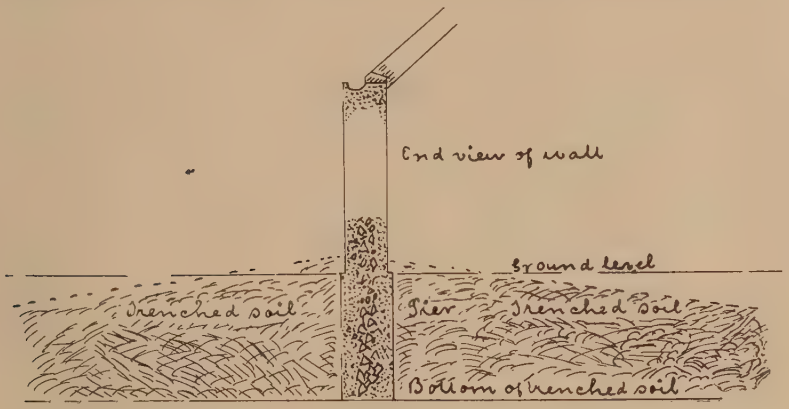
SECTION OF TOP OF CONCRETE WALL, SHOWING—A, RAFTER; B, TOP-PLATE; C, BOLT TO HOLD IT IN PLACE AND SUNK IN CONCRETE; D, THE GUTTERING; E1, HOW CHAMFERED OFF TO SUIT SLOPE OF RAFTER; E2, TO THROW OFF MOISTURE. SCALE, $\frac{1}{8}$ IN. = 1 IN.

Ventilators: Provide nine frames, 30 in. by 6 in. by 8 in., inside measurement, for each side. The top board to be stout enough to hinge ventilator on. These should be placed 6 in. above the level of the soil, and divided equidistant along the side of the house.

Door-openings: For a house of this size double or sliding doors are recommended, making an opening 6 ft. wide. The measurement given for length of house provides for seventy-two rows of glass on side with barge-boards at ends provided. The glass used is 16 in. wide, and 1 in. allowed for rabbeting of rafters—that is, seventy-two rows, each 17 in. wide, makes up the 102 ft. inside measurement.

It will take about 27 cubic yards of shingle and coarse clean sand, or eighteen dray-loads. The sand should not be in too large a proportion. Anything in the nature of clay, fine sand, loam, mud, or dirt must be carefully excluded. Use only good cement. The proportion should be six parts of shingle and sand to one part of cement. Mix thoroughly before applying the water, and then turn over three or four times before putting into the

moulds. Allow each layer to set well before putting in the next. The smoother the inside of the moulds the better the job will look when they come away. Have no nails projecting in the moulds, as they disfigure the work when taken away.



The finishing of the top of the wall and the making of the gutter will require strong, smooth cement.

The height of wall given is for a vinehouse. For a tomato-house it should be 4½ ft. to 5 ft.

THE FEEDING OF SHEEP-DOGS.

A CORRESPONDENT.

A GOOD many shepherds and farmers are possessed with the idea that a dog only requires feeding once in every two or three days, and treat their canine friends accordingly. They then wonder why their dogs soon get tired and do not work as well after a meal as they did on an empty stomach. The reason is obvious. When animals are compelled to fast for long intervals they are in such a famished, ravenous condition when the opportunity does come to obtain a meal that they gulp down their food, and if the supply of food be liberal they probably eat a good deal more than their stomachs can comfortably digest. The natural consequence of this is that after the meal they suffer from languor. If, however, they are fed regularly, at least once every evening, with a reasonable amount of nourishing food, they will keep in the best of health and spirits and be keen for work.

The writer has had a number of excellent sheep-dogs in his time, and he always believed in feeding them at least once a day,

in the evening for preference, and he got work and affection from them accordingly. Man has no better friend and companion than the dog in the whole animal kingdom. He should therefore treat his dog as he would like to be treated himself. No doubt a man could exist upon one good meal once in three days, but it is quite certain he would not have the stamina and capacity for work that he has on three good meals a day.

LUCERNE EXPERIENCE.

W. DIBBLE.

FORTY years ago I saw lucerne being grazed by stock for the first time. It was a luxuriant and profitable field growing in sand on the foreshore of the County of Somersetshire. Apart from the fact that the lucerne was thriving on pure sand, the feature which appealed to me at the time was the remarkable development of the individual plants, which were from 2 ft. to 3 ft. apart. The owner, a relative of my own, systematically grazed the lucerne with cattle, which remained on the lucerne the whole of the summer and autumn months, and, from what I remember, the stock did amazingly well on it.

The next time I saw lucerne profitably employed was on an ostrich-farm in the Auckland district, the Whitford Park Estate, of which an uncle was manager. The soil could hardly be regarded as an ideal medium for lucerne, being a poor marsh clay which puddled in the winter and baked hard in the summer. Yet lucerne was a most successful crop. The reason for this was that care had been taken in the first place to provide the best seed-bed possible under the circumstances. The soil was ploughed to a depth of 10 in., and was very thoroughly cultivated. Red clover was then sown and subsequently ploughed in, preparatory for the lucerne seeding. The lucerne was sown in drills about 16 in. apart. A good strike was obtained, and then the factor which was principally responsible for the success achieved came in—a Planet cultivator was periodically used to keep the soil between the rows well stirred and to kill any weeds which appeared. Under this continuous cultural treatment the lucerne provided a great wealth of green material in all but two or three winter months. The lucerne was cut with a sickle and chaffed for feeding to the young ostriches. By the time the last of the acre patch was reached the first portion was ready to cut again.

PICKING AND GRADING FRUIT FOR EXPORT.

A. B. MANSFIELD.

THE fruit-export season is now in full swing, and growers are sending in their fruit for grading and packing to some of the packing-sheds established in the larger centres. Attention has been drawn in the Bulletin No. 41, entitled "Handling Apples for Market," to the necessity for exercising the greatest care in picking and packing of fruit. Growers have been circularized, and it has been impressed upon them, too, by officers of the Orchards Division, that only the very best fruit should be sent forward. Still, in

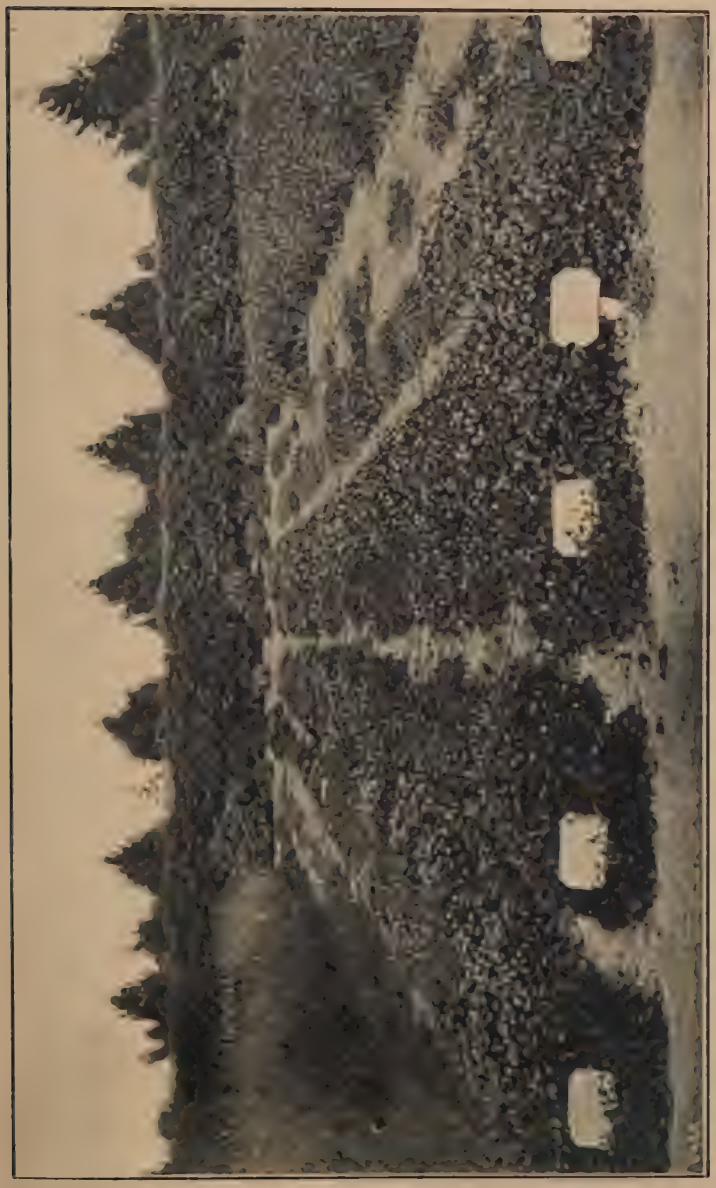
FRUIT TAKEN FROM LINES SENT TO CENTRAL PACKING-SHED TO BE GRADED. SUCH FRUIT SHOULD NEVER HAVE LEFT THE ORCHARD.

spite of all that has been done in this direction, and in face of the reports received from Mr. G. L. Tacon, special Commissioner in South America, a copy of which has been sent by the Director of Orchards to all fruitgrowers' associations, fruit continues to arrive at the packing-depots in very bad condition. Growers must realize the futility of paying freight on "pig-feed" sorts, which are always rigorously rejected. It is a waste of very valuable time, besides taking up space of better-quality fruit, to pack fruit similar to

the specimens in the accompanying plate. On examination it will be noticed that quite a large quantity of fruit is bruised, very badly russeted, and punctured either by fruit-spurs, or the nails which are generally in the ends of the cases into which the fruit is, in a good many instances, *poured*. Fruit should be picked into buckets or pails in place of the mediaeval picking bag or apron, and when placed in the case should be graded as carefully as time will permit. Where the fruit is graded for size by some of the grading-machines now in use it is quite possible during the rush of work that some injured or blemished fruit may get into the cases. Growers must realize that damaged fruit is inimical to the safe transport of the whole case, and when opened may influence the prospective buyer into believing that he has to stand an element of risk with the whole consignment, and so, to the detriment of the shipper, base his prices upon the sample that he has inspected. All growers and shippers are invited to apply for a copy of the bulletin mentioned, which will be mailed free to them from any officer of the Orchards Division.

WHITE LODINO CLOVER.

In the nursery of the Ruakura Farm of Instruction a clover which has produced the most leafage or feed during the exceptionally dry spell of the past season is White Lodino. The photograph of the clover-testing plots at Ruakura on the next page shows White Lodino in comparison with white clover, strawberry clover, and a special selection of white clover. Full opportunity was given to the clovers to make a free growth, and thus White Lodino had every opportunity for the development of its exceptional rooting-system. At the Albany plots, in North Auckland, the same development has taken place. This in contradistinction to the results obtained with White Lodino clover in small demonstration plots, where it is confined in closely boarded beds, and is thus not allowed proper scope for its naturally vigorous growth and its extensive rooting-system.



I. 2. 3. 4.
1. Selected White Clover. 2. Wild White Clover. 3. White Clover. 4. White Lucino Clover. 5. Strawberry Clover.

THE CLOVER PLOTS IN THE NURSERY OF THE KUAKUKA FARM OF INSTRUCTION.

REPLACEMENT OF PLANTS.

A. H. COCKAYNE.

THE study of the replacement of one species by another is of the utmost value in the solution of the weed problem. The causes of replacement are often difficult of determination, but a thorough knowledge of them would be of immense assistance in determining the practical value of the adoption of artificial replacement in the control of undesirable vegetation. In general, all phases of farming on cultivated land are merely the continued artificial replacement of one type of vegetation by another, generally accomplished by totally removing or destroying the previous vegetation and populating the bare ground by the type of plant that is desired. When this is successfully accomplished the original type becomes more or less non-existent in the new association that is formed. In cases of non-successful replacement the original vegetation or a totally new one, different from that desired, obtains partial or complete possession of the ground, and thus the weed factor becomes prominent. In many cases with regard to crops that mature rapidly, the elimination of the plant already occupying the ground need not be carried to the same extent as with other more slowly growing crops. The control is very largely for the purpose of depopulating the ground to such an extent that sufficient unoccupied ground is available for the reception of the required crop, but in every case due regard must be paid to the desired crop producing those conditions that will not favour the rapid re-establishment of the original vegetation. Sorrel-infested lands used for cereal-growing is a case in point. Again, with many other annual crops replacement by the required crop is secured during that period when the undesired vegetation is in a more or less dormant condition, and is virtually not occupying the ground. The sowing of crops before the germination of fat-hen takes place is a case in point.

It is, however, with regard to replacement occurring in permanent pasture that a study of the value of this in weed-control should yield valuable information. In the establishment of a pasture, naturally all those plants suitable for the conditions will become established during the first year, but after that period the extent of replacement will depend very largely on the relative suitability of the various elements to the conditions, to what extent

the association is a closed one, and on the variation in the action of the conditions, due both to the plants themselves and personal management of the land.

Annual plants in a permanent pasture are very likely to become replaced, especially if they do not continuously occupy the whole of the area on which they are present. With such plants the whole of the processes of establishment have to be repeated annually, and any interval occurring between their seeding and reappearance will result in an opening of the association, and will allow an opportunity for the spread of the more aggressive elements of the vegetation. Fat-hen, for instance, when sown with white clover in a mixed permanent pasture, is not likely to persist more than one season. After maturing, considerable interval elaspes before germination takes place, and by that time the ground left bare by the death of the fat-hen is occupied by other plants.

Biennial plants are nearly always replaced in a closed permanent pasture in the same way as are annual plants, but this is by no means true where the association is at all open. Foxglove is a good case in point. In a comparatively open association it often takes possession of the more open portions, and in excessively shading the other elements of the vegetation may gradually replace them. In controlling such weeds by mechanical means it is obvious that their removal only further opens the association, and unless the bare patches thereby created are sown with the seed of desired and suitable plants, re-establishment with foxglove is more likely to occur than with any other plant, especially if the ground contains much foxglove-seed. In fact, the mere removal of a plant before flowering only prevents it from seeding, and may perhaps improve the conditions for the germination of seed that is already in the ground or is capable of migration to the area in question. This fact is regularly recognized in forestry, where regeneration is often secured by judicious removal of trees.

A good example of a biennial that rapidly becomes replaced in an association is the ordinary Scotch or spear thistle, but in this case the replacement is in certain cases perhaps due to the presence of the plant improving the soil-conditions for the growth of other plants. In other cases it is simply due to the change of growth-form from a rosette to an upright plant that causes it to lose control of the territory it has gained. The ground previously covered by the radical leaves being left more or less bare, it has been seized upon by other plants before any fresh germination and establishment of the thistle can take place. If the ground, however, were ploughed after the seeding of the thistle and left fallow, the weed might be able to repopulate the ground almost to the exclusion of all other

plants. In such a case the various other competitors have been held under temporary control through ploughing, and this has resulted in making the conditions suitable and the space available for the development of the thistle.

A perennial is more difficult to dislodge from a pasture, even if the conditions are not particularly favourable for its continued development; but under such circumstances it, of course, cannot spread. A change in the conditions influencing the elements of the pasture, such as would be caused by drought, fires, overstocking, &c., is very likely to cause considerable and rapid replacement often in directions unfavourable to the farmer. Special attention should be given to the probable effects of such changes and methods adopted to secure replacement that will benefit, rather than injure, the productivity of the land. The effect of drainage in the rapid replacement by flax of nigger-heads and raupo is a good example of a change of condition directly operated by man in influencing replacement in a required direction.

A closed association, even if it consists of a plant that is not as suited for the conditions as another, cannot be invaded unless migration of the better-suited one occurs; and even when this does occur the more closed the association the less likely is the better suited plant to secure the conditions necessary for germination. Of course, if the association is at all open, invasion is extremely likely, the extent and rapidity being closely connected with the suitability of the invader to the conditions and their likelihood of remaining uniform. A closed association is not likely to be replaced by any weeds, and, of course, the object of all pasture-formation should be to secure such a type of covering. When replacement by weeds does occur under such conditions the rapidity and intensity of the invasion is naturally much slower than when the association is an open one.

A good example of replacement of a weed by a useful plant is afforded in various localities near Blenheim, where Californian thistle, even over comparatively large areas, has been completely replaced by lucerne. A temporary control has been instituted to secure the conditions necessary for the germination of the lucerne, and afterwards the ordinary methods of dealing with lucerne, together with the competition of the lucerne and the thistle for the occupation of the same habitat, has resulted in the suppression of the latter. This is simply an example of the entrance of a plant better suited for the conditions, resulting in its mastery over the less-suited species, a process that is perfectly natural, and one that must always occur. Another good case is the suppression of gorse by trees; but here temporary mechanical control continued beyond the point of the mere establishment of the trees is often necessary.

The spread of danthonia over much of our poorer lands is a splendid example of natural replacement under artificial conditions, and in this case the plant attuned to the conditions happens to be a valuable one from the pasturalist's standpoint. Unfortunately, the majority of the cases of replacements are those where weeds are replacing valuable plants. It, however, seems quite likely, with an increase in our knowledge of the causes and conditions governing replacement, that some methods of artificial replacement of serious weeds might be found practicable. One has only to consider the effect of cattle on fern country, and of sheep in the repression of ox-eye daisy, to realize that pasture-management should have a considerable influence on many of those weeds which, owing to the type of country they are occupying, cannot be profitably controlled by mechanical methods. The adoption of the indirect mode of attack, aiming at the ultimate replacement of weeds by desirable plants, appears to be the most feasible solution of the vexed problem of control of weeds in difficult situations.

INTERESTING TRIAL OF OAT VARIETIES.

LAST year two varieties of oats were tested at Wanaka Station, Pembroke, with excellent results—Record oat and New Abundance oat. The soil is naturally deep and good, and no manure has been applied to it for at least four years. The land has been cropped for years, and previous to being seeded with the oats a pea crop had been grown. Following this crop the land was fallowed.

On the 18th March of last year 2 acres were sown to the Record oat, the seeding being at the rate of 2 bushels to the acre, some crested dogstail being sown at the same time. The crop was cut in the middle of December, and was threshed on the 28th March of this year, the yield being 102 bushels to the acre. The grain was a splendid sample. The straw was rather too heavy, being well over 6 ft. high.

The New Abundance oat was sown at the same time, on the 18th March, the seeding being also at the rate of 2 bushels to the acre, but the seed in this case was sown with Western Wolths rye-grass and clover. It was also cut in the middle of December and threshed on the 28th March. The yield was 91½ bushels to the acre. The straw made splendid chaffing, being up to a length of 6 ft.

In both cases the grass and clovers were somewhat choked, but at the beginning of last month were coming away well.

SEEDS AND THEIR IDENTIFICATION.

E. BRUCE LEVY.

LUCERNE is now becoming one of the most valued crops in New Zealand agriculture, and hence a greater demand for its seed has been created. Lucerne-seed is produced to a large extent throughout Europe, Asia, America, and Australia, and to a lesser extent in New Zealand. It is put upon the market under many different designations, such as "American," "Peruvian," "Arabian," "Turkestan," "Hunter River," "New-Zealand-grown," &c. Of the different classes of lucerne-seed, that produced in New Zealand has, on the whole, proved the most satisfactory for our farmers to sow, and when buying lucerne-seed "New-Zealand-grown" should be stipulated.

For the most part the farmer must rely on the integrity of the seed-merchant, but in certain cases he can tell by a careful examination of the seed supplied whether or not he has received what he has ordered. The extraneous seeds often give a very reliable indication of the origin of the seed. Not only should the farmer be on the lookout for these indicators of origin when buying lucerne-seed, but also for adulterated lines and lines affected with dodder (*Cuscuta* spp.). The two most reliable indicators of origin are—

(1.) Asiatic star thistle (*Centaurea picris*).

(2.) Mediterranean rocket (*Eruca sativa*).

The three dodders chiefly found in lucerne-seed are—*Cuscuta epithymum*, *Cuscuta arvensis*, and *Cuscuta suaveolens*.

The main adulterant is English trefoil (*Medicago lupulina*).

Asiatic and European seed is always of a dull appearance; Australian and New Zealand seed is much brighter. In bulk this is a good means of distinguishing whether or not the seed is New-Zealand-grown.

LUCERNE.

Lucerne-seed is a little larger than red clover: Average length, $\frac{1}{10}$ in.; average width, $\frac{1}{18}$ in.

Colour varies from a greenish-yellow to a yellowish-brown.

Shape: From an irregular to a fairly well-defined kidney-shape; some seeds even more or less triangular in outline.

LUCERNE (MEDICAGO SATIVA). ENLARGED 10 DIAMETERS.

ENGLISH TREFOIL (MEDICAGO LUPULINA). ENLARGED 10 DIAMETERS.

The hilum or seed-scar (the scar indicating place of attachment of seed to its pod) is very well defined, and is situated about the middle of the long edge of the seed. The edge of the seed on which the hilum is placed is irregularly concave, often having just above the hilum a small projection. One end of the seed is often larger than the other, the increased width being due to a rising which indicates the root-tip of the embryo (rudimentary plant within the seed). The short stumpy seeds are often decidedly truncate (cut off, as it were) at the end.

ENGLISH TREFOIL.

English trefoil-seed is smaller than the average lucerne-seed: Average length, $\frac{1}{16}$ in.; average width, $\frac{1}{20}$ in.

EDGE VIEW OF LUCERNE SHOWING HILUM. ENLARGED 10 DIAMETERS.

Colour varies from a greenish-yellow to a yellowish-brown, a little brighter in colour than lucerne. Immature seeds, which are often present, are a decided green.

Shape: More or less oval or egg-shaped in outline; no angular faces as on the short stumpy seeds of lucerne — *i.e.*, not truncate.

EDGE VIEW OF ENGLISH TREFOIL SHOWING HILUM. ENLARGED 10 DIAMETERS.

The hilum is fairly well defined; it is situated much nearer the end of the seed than in lucerne, and is generally much darker in colour than is the hilum of that seed. The projection just above the hilum is very constant and much more abrupt than in lucerne. This abrupt projection, the size of the seed, the position of the hilum, and the absence of angular faces are the main points of distinction between English trefoil and lucerne. English trefoil is often found in a line of seeds with its pod attached. These are dark in colour, and are strongly marked with raised lines. These pods are readily seen, and serve as an indicator that shelled English trefoil is present.

ENGLISH TREFOIL (MEDICAGO LUPULINA) IN HUSK. ENLARGED 10 DIAMETERS.

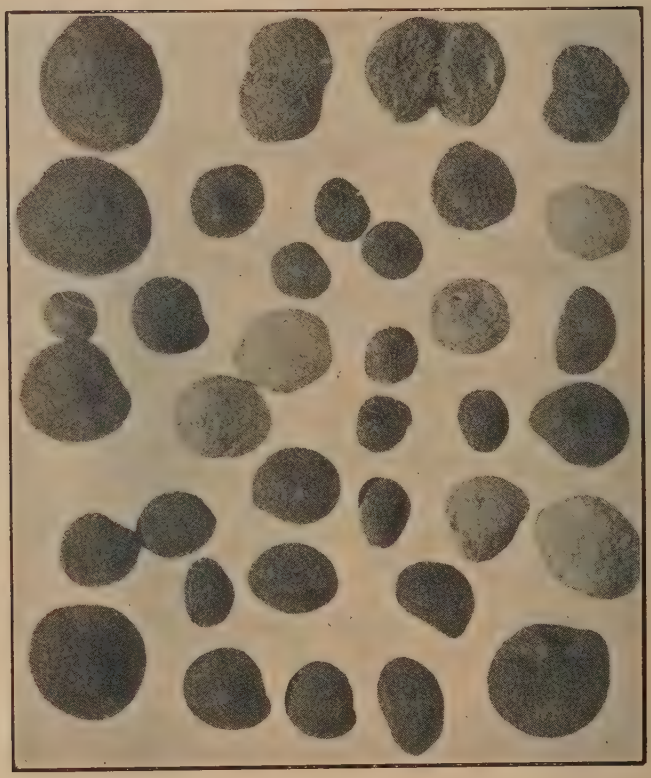
DODDER.

There are many different kinds of dodder, which are very difficult to distinguish one from the other. As, however, the presence of any kind of dodder in a line of lucerne or any member of the clover family should condemn the line, the buyer need know only the general characteristics of clover-dodder seed. It varies in size from $\frac{1}{40}$ in. to $\frac{1}{12}$ in. in diameter.

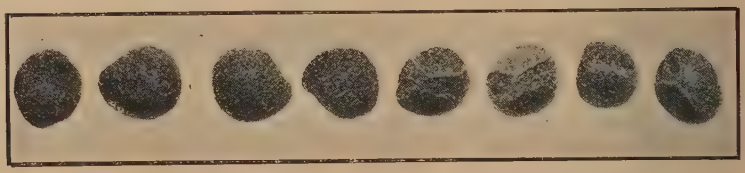
DODDER (CUSCUTA EPITHYMUM). ENLARGED 10 DIAMETERS.

Colour very variable, including a dirt-grey, a dull yellowish-orange, light and dark brown, and even a purplish tinge.

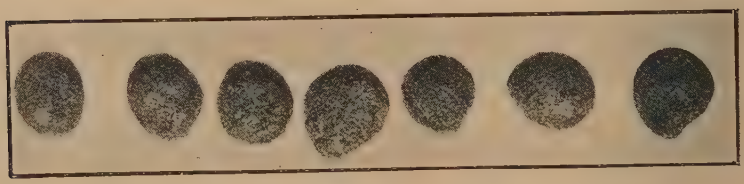
Shape varies from round or slightly oval to a somewhat flattened angular seed. The surface is dull and roughened. The smaller seeds, especially those of *Cuscuta trifolii*, resemble small particles of dirt rounded off. Unlike particles of dirt, however, they do not crumble when pressed.



DODDER (CUSCUTA SPP.). ENLARGED 10 DIAMETERS.



DODDER (CUSCUTA ARVENSIS). ENLARGED 10 DIAMETERS.



DODDER (CUSCUTA SUAVEOLENS). ENLARGED 10 DIAMETERS.

ASIATIC STAR THISTLE.

This seed is only found in lucerne-seed of Asiatic origin.

Size: Length, $\frac{1}{9}$ in.; width, $\frac{1}{16}$ in.

Colour: Whitish to a pale yellow.

Shape: In shape it is obovate (shaped like longitudinal section of an egg, the widest end being towards the apex of the seed). The apex of the seed is crown-shaped, sometimes slightly raised to a point. Some of the seeds are slightly curved. The surface is dull, and marked with slight ridges extending from the base to the apex.

ASIATIC STAR THISTLE (CENTAUREA PICRIS) ENLARGED 10 DIAMETERS.

MEDITERRANEAN ROCKET.

This seed is an indicator of southern European seed.

Size: Length, $\frac{1}{12}$ in.; width, $\frac{1}{16}$ in.

Colour: Light orange to a dull black or blue; often slaty-coloured.

Shape: Round in outline, and somewhat flattened.

The surface is dull and fairly smooth, being sometimes slightly roughened. The seed is marked more or less distinctly on each side by two black or deep-blue semicircular lines, close together, and extending from the base to the apex.

MEDITERRANEAN ROCKET (ERUCA SATIVA). ENLARGED 10 DIAMETERS.

Seeds are perhaps more variable in quality than any other goods the farmer has to purchase. The *purity* of seed varies according to the manner of growth, method of harvesting, and cleaning operations. The *germinating-power* varies with the climate and exposure to the weather during the period of growth — especially at the time of harvesting—as well as the mode of harvesting and storing (either in the rick or after threshing). Old or dead seeds are sometimes mixed with fresh seed of the same species in order to increase profits. Seed-testing or seed-analysis reveals the presence (or absence) of weed-seeds, which have an enormous capacity for damage when sown broadcast over the farm in impure seeds. It has been estimated that about 16½ million pounds sterling per annum is lost by farmers in Great Britain in growing (and getting rid of) weeds, a large proportion of which are sown with agricultural seeds.—*The Journal of the Board of Agriculture, London.*

OUR C.O.R. PUREBRED DAIRY COWS.

W. M. SINGLETON.

SINCE the last report was made on the records of cows which have qualified for certificate others have been honoured in this connection. During the first quarter of the calendar year few cows terminate their testing-period. The present list, however, contains a fair proportion of good records.

In Holsteins the most outstanding figures are those of Dutchland Colantha Mercedes, which, as a three-year-old, produced 756·99 lb. fat, and is placed at the head of her class. She is owned by Mr. G. Aitchison, of Kaitangata, and replaces his Dutch Girl as the best three-year-old Holstein. As a two-year-old Lady of Cliffside II gave 535·22 lb. fat, and is thereby placed fourth in her class. Other good records in this class are those of Holland Queen II, owned by Messrs. H. North and Sons, Omimi; Black's Butter-girl, owned by Mr. James Pirie, Woodlands; and Pontiac Johanna, owned by Mr. A. J. Gallichan, Tiakitahuna. In the four-year-old class Mr. J. Hart's Johanna Fayne Lady, with 532·38 lb. fat in 347 days, comes second only to Annette V of Brundee. In the mature class Longbeach VI, with 630·25 lb. fat in 365 days, comes fourth in her class.

Amongst the Jersey figures the record of Mr. E. S. Lancaster's Magnet's Waif II attracts attention. The illustration of this cow shows considerable capacity, and harmonizes well with the figures which place her third in her class.

The illustration of Mr. S. R. Lancaster's Neathead also evidences capacity in the cow. Her record of 565·75 lb. butter-fat places her in her class second only to Charm, owned by Mr. F. S. McRae. Neathead, we understand, milked continuously for twenty-four months, and her record was made during the second twelve months.

The three-year-old class has an acquisition in Eminent's Girl, owned by Mr. C. G. C. Dermer. Her record of 515·06 lb. fat places her fifth in her class.

DUTCHLAND COLANTHA MERCEDES.

JOHANNA FAYNE LADY.

MAGNET'S WAIF II.

NEATHEAD.

Good cows are continuously coming to the fore, and dairymen are being given more choice in the selection of butter-fat-record bulls. These should receive first consideration.

Name of Cow.	Name and Address of Owner.	Age at starting Test.	Fat req'd. Cert.	Yield for Season.		
				Days.	Milk.	Fat
		HOLSTEINS.				
Two-year-old Class.		Yrs. Dys.			lb.	lb.
Lady of Cliffside II..	W. I. Lovelock, Palmerston North	2 117	252·2	365	16,320·50	535·22
Holland Queen II ..	H. North and Sons, Omimi	2 141	254·6	352	11,234·50	413·18
Black's Butter-girl ..	James Pirie, Woodlands	2 142	254·7	365	9,856·50	401·22
Pontiac Johanna ..	A. J. Gallichan, Tiakitahuna	2 9	241·4	348	11,868·10	400·54
Helena Plus Girl ..	H. North and Sons	1 295	240·5	320	9,916·50	339·30
Gipsy Queen ..	James Pirie, Woodlands	2 52	245·7	365	9,765·80	335·13
Three-year-old Class.						
Dutchland Colantha Mercedes	G. Aitchison, Kaitangata	3 335	310·5	365	19,387·00	756·99
Grebegga de Kol of Avondale	R. Gilmour, Tiakitahuna	3 134	290·4	365	13,720·40	469·23
Dominion Empress ..	Weraroa Experimental Farm	3 84	285·4	350	9,671·75	295·87
Four-year-old Class.						
Johanna Fayne Lady	James Hart, Raumati	4 172	330·7	347	15,936·60	532·38
Mature Class.						
Longbeach VI ..	W. I. Lovelock, Palmerston North	5–6 yr.	350·0	365	17,807·70	630·25
Lenore	Weraroa Experimental Farm	Aged	350·0	365	12,168·50	400·19
		JERSEYS.				
Two-year-old Class.						
Duchess of Collingwood	F. E. Hellyer, Dunedin	1 214	240·5	236	5,052·70	285·31
Three-year-old Class.						
Eminent's Girl ..	C. G. C. Dermer, Waipiko	3 60	283·0	365	10,411·00	515·06
Siren of Bulls ..	Dr. F. J. Watson, Bull's	3 29	279·9	365	7,985·30	398·41
Four-year-old Class.						
Neathead	S. R. Lancaster, Palmerston North	4 134	326·9	362	8,673·50	565·75
Snowcap	E. Hodges, Waimana	4 223	335·8	351	6,536·90	377·02
Mature Class.						
Magnet's Waif II ..	E. S. Lancaster, Levin	6 265	350·0	365	9,573·50	604·00

The export surplus of wheat from Argentina, according to the *Review of the River Plate* of the 5th February, was estimated at 3,200,000 tons, and of oats 600,000 tons. The production of maize is estimated at 39,523,000 quartens, against 38,180,000 quartens last year.

LAWES AND GILBERT COMMEMORATION LABORATORY.

In acknowledging a donation of £25 from the New Zealand Government towards the fund being raised in Great Britain to erect a laboratory as a memorial in connection with the centenary of the birth of Sir John Lawes and Sir Henry Gilbert, the founders of the famous Rothamsted Experimental Station, in England, Mr. E. J. Russell, D.Sc., Director of Rothamsted, writes as follows to the Secretary of Agriculture, Mr. F. S. Pope:—

"On behalf of the Committee of the Lawes and Gilbert Centenary Fund I beg to tender to you our sincere thanks for your subscription to the new laboratories to be erected in commemoration of the work done for agriculture by these distinguished scientists. It is a source of great gratification to all of us that the New Zealand Government should join in the movement, and should co-operate with us in rendering honour to the founders of agricultural science. There are many and close ties between the New Zealand agriculturist and his British colleague, and we welcome your donation as a further bond. I can only add that we should be pleased to show our plots and laboratories to any of your officers and farmers that happen to be in this country."

WASTE OF POTASH.

Co-operation is suggested for the collection and incineration of many waste marine and land plants, such as furze, hedge-clippings, bracken, &c., as a source of potassium salts. The following figures give the potash-content of the ashes: *Fucus vesiculosus, Fucus serratus,* 4 to 5 per cent.; *Fucus nodosus,* 13 per cent; oarweed (*Laminaria saccharina*), 15 per cent.; *Enteromorpha intestinalis,* 7 per cent.; *Enteromorpha compressa,* 10 per cent.; *Ulva latissima,* 4 per cent.; *Zostera marina,* 9·5 per cent.; bracken, 60 per cent.; *Boletus edulis,* 50 to 57 per cent.; *Agaricus velutipes,* 78 per cent.; the heath-mosses (*Hypnum Schreberi* and *Hypnum splendens*), 28 to 30 per cent.; hop-bine, 25 per cent.; groundsel (*Senecio vulgaris*), 43·5 per cent.; common broom, 33 per cent.; willow-bark, 24 per cent.; sweet-chestnut bark, 20 per cent.; common furze, 28 per cent.; *Euphorbia amygdaloides,* 39 per cent.; Virginian-creeper leaves, 25 per cent.—*Journal of the Society of Animal Industry.*

LANE'S PRINCE ALBERT APPLE.

THE photograph illustrates a seven-year-old tree of the above variety growing in the orchard of the Ruakura Farm of Instruction. This characteristic specimen is not more than 5 ft. high. The average crop of the three seven-year-old trees at Ruakura last season was

75 lb. of fruit. The fruit of Lane's Prince Albert is really a cooking-variety of apple, but is also of fair dessert quality. The variety is fairly blight-resistant. It is very suitable for windy situations.

THE DOUGHERTY APPLE.

THE accompanying photograph is of a section of a Dougherty apple-tree in the orchard of Mr. C. H. King, Havelock North. This variety of apple does remarkably well on the Havelock North hills,

where Mr. King's orchard is situated, as it does in many other parts of the district. The Dougherty tree is very prolific, grows to a good size, and colours splendidly.

On the 1st March the following quantities of grain were estimated by the Bureau of Statistics of the U.S.A. Department of Agriculture to be still in farmers' hands, stocks on the same date in 1914 being in brackets: Wheat, 152,903,000 bushels (151,809,000 bushels); maize, 910,894,000 bushels (868,692,000 bushels); oats, 379,369,000 bushels (419,476,000 bushels); and barley, 42,889,900 bushels (44,126,000 bushels).

THE FARM ORCHARD: PRUNING.

W. C. HYDE.

MANY a farmer when asked to clean up his orchard-trees, in compliance with the Orchard and Garden Diseases Act, 1908, is faced with a problem that he finds by no means easy; and it is often solved in such a drastic manner that the trees are rendered unprofitable for some years to come, or much labour and material is used to prune and spray the trees without any satisfactory results being attained. Trees of this class are usually rather large and full-grown, with crowded branches and stumps a foot or so long—the butts of boughs that have been removed—projecting from the trunk. A fair crop of fruit is carried, but it is infected with codlin-moth and disfigured with black-spot; it is also rather small by reason of the hosts of scales and aphides that cover the limbs and are constantly feeding on the elaborated sap of the tree. Such fruit will not keep, and is of little use at any time. How can these trees be put into a condition to satisfy the Inspector and provide clean, sound fruit for present and future use? The winter months of June and July, when the trees are leafless, afford the best opportunity of improving their condition. During spring, summer, and autumn the tree is a busy organism: unfolding flowers and leaves; elaborating rising sap that is distributed all over the tree to strengthen trunk and limbs and add growth inch by inch till autumn approaches; setting the fruit and developing it to full maturity; building leaf-buds everywhere and fruit-buds on the older wood, on spurs in some cases, and on the younger wood in others. These are all operations that form a very full programme for the warmer months during which it takes place. During this period comparatively little pruning or spraying may be done with advantage, owing to the liability of interfering with the programme above referred to. Towards the end of autumn, however, activity gradually ceases, leaves and fruit are cast, and the dormant period commences, when new fibres dry and toughen. It is then that major operations, if proper executed, may be performed with safety.

Let us, then, proceed to the orchard and see what can be done to realize our object. A saw is really the only tool we need take with us, and if it is the strong narrow saw with a

wide set, specially made for pruning, so much the better. Commencing with such a tree as above described, examine those stumps projecting from the trunk of the tree, maybe but a few inches or as much as a foot or two, left probably in the hope of their breaking into new growth. These are found decayed, various fungi have taken up their abode in the tissues, and where these latter have been displaced insects of many kinds make their home and assist in the work of destruction. Let us join forces with these creatures to dispose of the unsightly and valueless limb (if the work is entirely left to them they are only too often found to carry the work too far in their enthusiasm). Enter the saw in the angle formed by branch and trunk and sever the projection in a clean and neat manner—that is, flush with the trunk of the tree. We are now on the living wood once more, and if the cut has been neatly performed one or two seasons will heal it quite securely. Deal with other cases of the kind on this tree in a similar manner. One or two dead branches may be found, perhaps, which may also be dealt with similarly. The tree is now relieved of these decaying encumbrances, but is still high, crowded, and diseased. The general tendency is to rashly cut off the tops of such, and bring them low for the sake of convenience. The object, of course, is quite a worthy one, and in training young trees it is most desirable to manage them in such a way that that object may be attained; but if they have been allowed to grow high it is not generally possible to lower them considerably without upsetting that poise that is known as maturity, and is the fruitful state.

Let us next turn to the problem of relieving the crowded condition of the branches. To thin them out and let in the sunshine is to let in life to the numerous dormant buds along their length, to awaken them to vigour and fruitfulness. Should any branches crowd the centre, remove them first, being careful to cut them off flush with the limbs from which they originate. When this is completed, of the branches that remain remove those that chafe and rub, or that are even likely to do so, thus leaving all limbs clear and the whole tree comparatively "open." This will complete the operation of pruning — that is, under these circumstances.

All the wood that has been cut out, and which will be more or less infected with blight, should be burnt, and in the more useful converted form of potash may be applied to the roots of the trees as a fertilizer. In this way is a large percentage of the blight definitely disposed of, and the relieved tree stands in a condition in which, without any difficulty, it may be sprayed effectually and with economy.

TWO NEW VARIETIES OF TOMATOES.

A. W. GREEN.

AMONGST the new types of tomatoes imported by the Department of Agriculture during the last two years the varieties Prince Borghese Red and King Humbert are noted for their high standard of productivity. The photographs were taken on the

PRINCE BORGHESE RED.

trial-grounds at Ruakura Farm of Instruction. The average fruit is of medium size, and on some plants, where a little thinning was carried out, fruit of good size was secured. On one bunch of Prince Borghese Red are not unfrequently found from sixty

to seventy fruits. The quality is good, the skin being very thin, and the flavour excellent.

With the variety King Humbert the skin is thick and tough, and can be recommended for bottling purposes, the skin being less liable to crack in the cooking. Prince Borghese Red was imported

KING HUMBERT OR BEST NAPLES TOMATO.

from the noted French firm, Messrs. Vilmorin, Andrieux, and Co., Paris, in September, 1913.

King Humbert, sometimes called "Best Naples Tomato," was imported from Messrs. Dammann and Co., San Giovanni a Teduccio, Naples, in January, 1914.

Erratum.—In Mr. W. Wright's article on "Dairy-farming in Switzerland," in the November issue of last year, it was stated, on page 350, that the price paid for whey was 4½d. a gallon; this should have read 4½ centimes, or about ½d. a gallon.

THE FRUIT-FLY.

T. W. KIRK.

SOME Australian orchardists consider the New Zealand regulation requiring a declaration that no fruit-fly is known to exist in or within *one* mile of the orchard where the fruit was grown is too severe.

A proclamation recently issued in South Australia is as follows:—

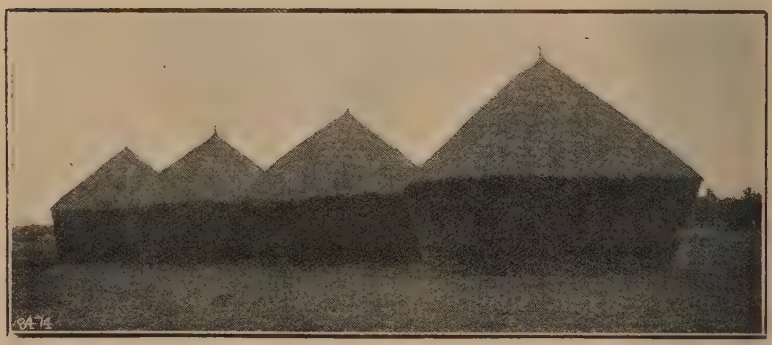
Regulation relating to the Introduction of Fruit into South Australia.

1. No fruit of any tree or plant shall be introduced into South Australia from the States of Queensland, New South Wales, and Western Australia, in the Commonwealth of Australia, unless accompanied by a certificate, signed by an Inspector of Orchards stationed in the district wherein such fruit was grown in the exporting State, setting out and declaring the following facts:—

(*a.*) That no fruit-fly has been known to exist for the *two* years previous to the signing of such certificate in the orchard from whence such fruit was picked or packed.

(*b.*) That no fruit-fly has been known to exist in any orchard or garden within *five* miles of the land on which the said fruit was grown.

This seems to suggest the desirability of making the New Zealand regulations more stringent.



HAYSTACKS AT RUAKURA FARM OF INSTRUCTION.

THE NEW ZEALAND PAVILION AT THE PANAMA PACIFIC EXPOSITION.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith. The question should be written only on one side of the paper.

LUCERNE.

J. PERRING, South Beach, Greymouth :—

I have some land with a hard cement bottom, with very loose gravel under the hard belt. Do you think that if this land was drained lucerne could be grown without having to take up all the cement bottom where grown ?

The Fields and Experimental Farms Division :—

We do not consider it advisable to try lucerne on land with a hard cement bottom. It is doubtful whether it would pay to go to the expense of digging out the hard-pan for the growing of this crop in a climate not too fitted for its successful extensive culture.

WIREWORMS.

W. MARKS, Kanieri, Westland :—

Could you give me any treatment to destroy the wireworm ?

The Biologist :—

Several species of wireworms are abundant in New Zealand, but these differ only in minor characters. All are larvæ of "click-beetles." Ordinarily they breed in grass land, the larvæ feeding on the roots of the grasses. Under such circumstances their presence is rarely noted, because the ground is so filled with roots that their work does not attract attention. When such ground is broken up and used for potatoes or root crops the larvæ have not the same abundant supply of food, and they quickly become a serious menace to the crop. The larvæ remain in the grub stage for two or three years, so that they are often abundant in soil that has been broken up only one or two years. Suitable crop-rotation, autumn ploughing, and thorough cultivation are the only means of dealing with this pest. Wireworms do not attack clover or other related plants, and where fields are badly infested the growing of legume crops is advised. There are no suitable applications that can be made to the soil that will kill the larvæ unless made so strong as to be injurious to plant-life. Manuring, however, is often extremely beneficial, not for the purpose of killing the grubs, but to stimulate the growth of the crop so that it can resist and recover from an attack.

IRISH YEW AND IRISH JUNIPER.

HARRY VAUSE, District High School, Cambridge :—

Are the above plants suitable for hedges? Are they poisonous if eaten by cattle or horses? Will they grow from cuttings or from seed, and where can these be procured?

The Orchards, Gardens, and Apiaries Division :—

These make good ornamental hedges. They may be grown both from seed and cuttings. They may be readily obtained from the larger nursery and seed firms. The yew is not now used in regular medicine. Cases are on record of fatalities amongst horses and cows as a result of eating the foliage, and of human beings (children) who have swallowed the "berries." Juniper (*J. sabina*) preparations are used in medicine for external application, but should not be administered internally. Juniper (*J. comminis*) is used in medicine, also for flavouring gin.

FOOT-ROT IN SHEEP.—POISONING CRICKETS, RABBITS, AND HOUSE-FLIES.

"ARSENIC," Kaipara :—

Can you tell me how to deal with arsenic in the following cases :—

1. For foot-rot in sheep: How should it be dissolved from the powder, and what quantity per gallon of water used? It is, we find, difficult to dissolve by itself in water.

2. For crickets (which, though not so numerous this season, are still a pest): How would you apply the poison? Some years ago our County Council applied to you for advice on cricket-extermination, and among other palliatives you recommended arsenic mixed in sharps, but no proportions were stated.

3. For rabbit-extermination: How is it best used?

4. For house-flies: How is it dealt with? We have heard of its being used with great success for this purpose.

The Live-stock and Meat Division :—

1. I cannot recommend you to use arsenic in the treatment of foot-rot. A more effectual and less dangerous substitute would be sulphate of copper (bluestone). A convenient preparation can be made by carefully mixing over a slow fire one part of powdered bluestone with one of lard and two of tar. This is applied to the affected feet after removal of loose and diseased horn.

The Fields and Experimental Farms Division :—

2. Where poisons are decided upon for treating crickets (there is danger of stock grazing on the treated pasture, hence spelling it for a period during treatment is advisable) the following mixture, known in Canada as "Criddle mixture," and reported as effective for grasshoppers and crickets, is recommended for trial: Five pails of fresh horse-manure moistened with one pail of water, with 2 lb. salt and 1 lb. paris green thoroughly mixed therewith. The paris green is an arsenical poison. The mixture is best applied with a trowel or small shovel where the crickets are thickest, and along the fences, where they are more prone to collect. Burning over old pastures late in the autumn or early in spring and practising a short rotation of crops are also recommended where the farming system permits. As the land becomes more effectively drained and more systematically cultivated the pest should become reduced.

3. For rabbit-extermination there are several jam poisons on the market, such as "Toxa" and "Shawtwork." These are said to contain arsenic. Carrots cut up into small squares and dusted with arsenic powder are used with effect.

4. For flies there would be a danger in using an arsenical poison, on account of flies contaminating food. The most feasible method of reducing this pest is to remove anything that is likely to cause their increase.

STRANGLES.

A. McKENZIE, Grove Bush :—

I have a two-year-old gelding which was attacked with strangles about a year ago. The disease at the time broke out under the jaw, but has since healed. The seat of the trouble was about midway between the jaws. Since the orifice has closed a hard swelling has made its appearance on each side, forward towards the mouth and slightly to the rear. Could you kindly tell me how I may remedy such a defect ?

The Live-stock and Meat Division :—

There is no effectual remedy. The hard swelling is the result of formation of inflammatory fibrous tissue. This may tend to become rather smaller in time, but will never entirely disappear.

FOUNDATION-MAKING.—TAKING QUEEN FROM HIVE.

N. J. B., Woodville :—

1. I have a quantity of beeswax on hand : could I get it worked up into foundation by some one at a small cost per pound ? As I am only offered 1s. 3d. a pound for the wax and need the foundation next season, do you not think it would be a good plan ?

2. What is the easiest way to get the queen out of a strong colony of bees ?

The Orchards, Gardens, and Apiaries Division :—

1. It is a good plan to get your wax made into foundation. The nearest man to Woodville would be Mr. J. Nicholas, beekeeper, Hawera, and his price is 8d. per pound.

2. In order to extract the queen from a hive, sift all the bees through a queen-excluder nailed on to the bottom of a super and placed over another super containing empty combs. The queen will be left on the excluder, as she is unable to go through.

AILMENTS OF SHEEP.

"BUSH," Waverley :—

Can you give me any information about sore noses in lambs—its cause, prevention, and cure ? It has been very bad here this year. Also, can you give information about temporary blindness of sheep ?

The Live-stock and Meat Division :—

Sore noses in lambs are frequently due to slight abrasions of the skin, through which micro-organisms enter and set up suppuration, and sometimes local death, of the part. One organism in particular is liable to produce this form of trouble, the so-called necrosis bacillus. If practicable, the remedy is to wash the noses of the affected lambs with a solution of Jeyes' fluid or similar compound, subsequently applying a little zinc-oxide ointment to the part. In regard to the temporary blindness of sheep, this trouble appears to proceed from some digestive disturbance, accompanied by the absorption of poisons into the system which affect the nerves supplying the parts. Sheep suffering in this manner frequently recover when given a change of pasture. A change of feed seems to be essential in combating a condition of this nature.

FEEDING DUCKS.

"AMATEUR," Auckland :—

Is it injurious to ducks to feed them on dry wheat ? Should the wheat be soaked in water, or boiled ; or will either do ? If soaking will do, for how long should it be soaked ? Does soaking or boiling wheat detract from it as an egg-producing feed ? I mostly feed on wet mash in the morning and wheat in the evening. Because of the high price of wheat I sometimes drop it and feed mash morning and evening.

The Live-stock and Meat Division :—

The feeding of dry wheat to ducks will not have an injurious effect on them, but from an egg-producing viewpoint I prefer to give it boiled or steamed, only sufficient water being used to make it swell, and at the same time be in a fairly dry condition when fed. The boiling of wheat has the effect of increasing its bulk, largely on account of the water it takes up, therefore an ample quantity of it must be supplied at each meal in order that the bird may get sufficient of the solid matter to produce her special egg-yield. Owing to the high cost of wheat you cannot do better than feed a mash at all times. Of course, to secure the best results animal food, such as boiled meat, meat- or blood-meal, must be included in the diet, and from a health viewpoint green food is also necessary.

SILAGE.

C. V. R., Brydone :—

I am going to try next year to grow crops for silage purposes—say, for about twenty cows. How many acres would I need for that, and what is the earliest date I could start to sow oats and peas, oats and vetches ? Would I take off the oats and peas first and then sow vetches by itself for seed ? Mr. Dibble in writing about silage mentions some beans : what kind of beans does he mean ?

The Fields and Experimental Farms Division :—

It would be necessary to cultivate from 3 to 4 acres to grow sufficient material to make into ensilage for about twenty cows. Sow 1¾ bushels of oats and 1¼ bushels Golden vetches. The earliest date on which you could sow would be June in autumn, and October in the spring. Golden vetches, however, should be sown preferably about the middle of October, when the land is warm and in good tilth. The beans referred to in Mr. Dibble's article are horse-beans, and are generally used in a soiling-crop. Any further information on this subject could be obtained by writing direct to Mr. Dibble, whose address is Department of Agriculture, Palmerston North.

INOCULATION OF CANADIAN THISTLE WITH RUST BLIGHT.

John Dickson, Christchurch :—

Has the inoculation of Canadian thistle with rust blight by the Agricultural Department been successful ?

The Fields and Experimental Farms Division :—

The inoculation of Californian thistle with thistle-rust (*Succinia suaveolens*) has been extremely successful in certain cases, and it is quite likely that when improvements are made in the preparation of the infecting-material inoculation will become valuable in controlling thistle in localities where mechanical methods are in application. The thistle-rust is, however, rather slow in action. It apparently takes several years to subdue a patch.

CALIFORNIAN-THISTLE ERADICATION.

F. H. Gill, Nelson :—

Is there any absolutely sure way of getting rid of a patch of Californian thistle about 10 yards square ?

The Fields and Experimental Farms Division :—

The patch of Californian thistle should be hoed once a week during the whole growing season of the thistle—say, from the end of August to the end of April. If this procedure is thoroughly carried out the patch will be completely killed in a single season, and the ground can then be utilized for any agricultural purpose. If the patch is too far away to carry out this hoeing, then the cutting-down of the thistle and the spreading of agricultural salt an inch or so thick on the patch will kill the plants, but the ground will be spoilt for the growth of vegetation for some considerable time.

ONION-CULTURE.

"INQUIRER," Glorit :—

Kindly oblige by furnishing me with all possible information at your disposal *re* cultivation, manuring, spraying, &c., of onions.

The Editor :—

If you will furnish your name and address a copy of the Department's *Journal* for July, 1911, containing an article on "Onion-culture" by Mr. W. H. Taylor, Manager of this Department's Arataki Experimental Farm, will be posted you.

TALL FESCUE.

"TALL FESCUE," Taupaki :—

I understand that tall fescue is a very bad grass to get on to a person's property, especially on rich flats. A neighbour of mine has sown down tall fescue this year, and although it is on the rise there is only the road between us. I am afraid of it getting on to my flats, and I would like to know if I have any redress. Could I make him plough it under again? It is quite bad enough to keep one's own weeds down without having to contend with other people's folly. I would be greatly obliged if you would let me know through your *Journal* next month.

The Fields and Experimental Farms Division :—

As tall fescue is not included in the schedules of the Noxious Weeds Act, there are no restrictions on the growing of this grass.

EAR TROUBLE OF STOCK.

"SUBSCRIBER," Cape Foulwind :—

Can you acquaint me of the disease and cause of same of the following? A friend of mine has a three-year-old heifer that at the age of one year was deprived of her ears. The ears frizzled up (like a piece of corduroy cloth) very hard, and fell off after being wetted by rain. The animal does not seem to be affected in any other way. Again, a cat about nine months old is affected the same way. In this case the ears lopped over like a fox-terrior dog's ears, got hard, and fell off one wet day.

The Live-stock and Meat Division :—

The cases related by you, as affecting a heifer and also a cat, are very remarkable, and I have never encountered identical symptoms. The nearest approach to such cases that I have seen have been the result of infection of the ears or other appendages of the body by the bacillus of necrosis. This causes a dry gangrene of the part, with a certain amount of shrivelling, and sometimes the dropping-off of a portion of the tissue attacked. Possibly this may have been the cause in the subjects referred to by you.

TRANSPLANTING BLACK-WATTLE.

"DAIRYMAN," Waikato :—

Will you inform me whether black-wattle seedlings can be transplanted safely? The seed was sown in the spring, and some of the trees are up to 2 ft. in height. When should I transplant?

The Orchards, Gardens, and Apiaries Division :—

The black-wattle (*Acacia decurrens*) is rather difficult to transplant successfully. The usual method adopted is to sow the seed where the trees are to remain permanently, and thin out to the required distance. In lifting the plants care should be taken to see that the young roots are not broken to any extent. Transplanting may be done in the autumn, provided, of course, that the ground is in a fit state to work. If too wet it may be left till better conditions exist in the spring.

LAND SUITABLE FOR AN ORCHARD.

J. PERRING, South Beach, Greymouth :—

I have some land with a hard cement bottom with very loose gravel under the hard belt. Do you think that if this land was drained fruit-trees could be grown without having to take up all the cement bottom where grown ?

The Orchards, Gardens, and Apiaries Division :—

You do not give any indication as to the depth or character of the soil *above* the "hard cement bottom." It is not possible to advise without this information.

MANUFACTURING MANURES.

J. PERRING, South Beach, Greymouth :—

I wish to inquire if you know of any book dealing with the subject of manufacturing manures, as there is a lot of valuable material going to waste in this district which I wish to utilize for my holding. If so, would you inform me where it can be obtained ?

The Chemist :—

Griffiths's "Treatise on Manures," published at 7s. 6d. by Whittaker and Co., London, may be obtained in New Zealand, and is perhaps the most suitable work available for the amateur manufacturer. I shall be pleased to give you any advice if you will give me further particulars.

BEEKEEPING.

A. H. BURWELL, Kaimata :—

I would like to ask you your advice about starting beekeeping with one or two hives. Which are the best kinds of hives to get ? What is the best time of the year to start, and what would be about the cost of starting ?

The Orchards, Gardens, and Apiaries Division :—

It is advisable to commence with one or two hives in the spring, and work up from these, and so gain experience. Secure the latest Langstroth hives, which are obtainable from any of the supply-dealers. The spring is the best time of the year to commence beekeeping. Each hive, without bees, would cost approximately 15s. complete. Start with the variety called "black bees."

GREEN FOOD FOR DAIRY COWS.

H. BIRD, P.O., Hamilton :—

I shall be glad if you can send me information as regards sowing for continuation of green stuff for dairy cows all the year round, also as regards manure, as my ground is peat (swamp).

The Fields and Experimental Farms Division :—

Beginning now, you should seed Emerald rye and vetches (2 bushels of the former to 1 of the latter) or Cape barley (1½ bushels) and vetches (1 bushel). The Hairy or the Black Scotch Winter vetches are more suitable for winter growth. Buda kale can be sown at the same time, and will provide succulent feed in the early spring, to be fed off with the subsequent growths of the above mixtures. Seed the kale at the rate of 10 lb. per acre broadcast, or 4 lb. in drills. Western Wolths can be seeded in winter for spring feed or in spring for summer feed. Seed 30 lb. per acre. For midsummer and early autumn seed in late spring 51 lb. oats, 30 lb. Early Amber sugar-cane, and 7 lb. red clover per acre. This provides a continuous supply of green feed, and is specially suited to dry summers. Cow-grass should do well on your land, and could be seeded in early spring for summer and autumn feed. Seed at the rate of 10 lb. per acre. For late autumn and early winter feed, again, Italian rye (30 lb.) and common vetch (1 bushel) can be seeded in summer or

early autumn. On your class of land Italian rye would last for two or three years, if required. To supplement feed in early winter Emerald rye and vetches could be again seeded in mid-autumn. Your soil possesses a superabundance of nitrogen. Phosphates and potash (for all crops) are required thereon: 3 cwt. to 5 cwt. basic slag and 1 cwt. muriate of potash would be required. If slag is not procurable, 3 cwt. to 4 cwt. basic superphosphate should be used. Instead of the muriate of potash 4 cwt. of kainit per acre could be used. Lime should be applied at any time now or later at the rate of at least 1 ton per acre of ground burnt lime. Heavy liming is essential on peat soils. In the event of the above fertilizers being applied to a crop grown just previously for the crop being seeded, cut the phosphates down by a third and the potash by half.

DESTROYING SCALE, ETC., WITH WASHING-SODA.

A. H., Western Plains :—

Some years ago I read in the *Agricultural Gazette* that a quarter of a pound of washing-soda in a bucket of water, and thrown over the roots of fruit-trees, will quickly get rid of black scale, smut, red scale, Indian wax, and white scale. Is this worth while trying in New Zealand? Would it do any good on roses which get all white?

The Orchards, Gardens, and Apiaries Division :—

It is not considered that washing-soda dissolved in water and thrown over the roots of fruit-trees would be of any use in controlling scale. What is required for the control of this pest is a contact-spray. For scale attacking deciduous fruit-trees red-oil emulsion, applied in the winter in the proportion of 1 of emulsion to 15 water, when trees are quite dormant, has given splendid results. Red oil already emulsified for mixing with water is obtainable from seedsmen and others. For evergreen trees, such as lemon and orange, use kerosene emulsion—1 part emulsion to 15 parts water. Copy of leaflet giving directions for making is posted you. The white appearance on the rose-trees is probably due to attacks of mildew. Spraying with potassium sulphide, 1 oz. to 2 gallons of water, will control this disease.

LYSOL FOR SCOUR.

D. BLACKADDER, Reefton :—

When dosing calves with lysol for scour, as described in the *Journal*, should they be fed as usual, or should the lysol be given when the stomach is empty or nearly so?

The Live-stock and Meat Division :—

When dosing calves with lysol for scour they should be fed as usual, with the addition of 1 lb. crushed oats and 4 lb. of chaff per day.

COW-GRASS AND LUCERNE SEED.

WILLIAM STUDHOLME, Pembroke, Otago :—

By sowing cow-grass in September could I cut a payable crop of seed from it the following autumn? What is considered a good yield per acre of cow-grass seed and also lucerne-seed for a well-established plot?

The Fields and Experimental Farms Division :—

Unless under specially favourable soil and climatic conditions you would not obtain a payable crop of cow-grass seed in the autumn following a seeding in September. The comparatively dry climate experienced in your locality would accentuate this contention. Under average conditions the second-year stand of clovers is best for obtaining seed, and from this the second cutting, providing the first cutting is done early (when the crop is one-third in bloom), is best from every point of view for obtaining the largest quantity of good-quality seed. Seven bushels (about 450 lb.) per acre is considered a good crop under average conditions. A good crop of lucerne produces seed at the rate of 4 to 8 bushels (240 lb. to 500 lb.) per acre under average conditions. As much as 13 bushels (800 lb.) has been obtained, however.

CATECHISM OF PRACTICAL AGRICULTURE.

CONTINUED.

PRIMROSE McCONNELL.

104. *Give the quantities of seed per acre for wheat, oats, and barley respectively.*

Wheat, 2 bushels; barley, 2 bushels; oats, 3 bushels.

105. *What are the advantages accruing from a liberal seeding?*

The yield of grain is increased, and there is greater freedom from rust.

106. *Is there any known seed-dressing that will prevent rust?*

No absolute preventive of rust has yet been discovered, except by selecting or breeding rust-resistant varieties.

107. *What other disease attacks the aforementioned cereals?*

Smut.

108. *Is there any preventive in this case?*

Smut may be prevented to a great extent by treating the seed with a solution of formalin.

109. *Describe the treatment.*

Spread the seed on a clean floor on the evening previous to sowing. Sprinkle thoroughly with a solution of 1 part formalin to 40 parts water, and turn over the heap repeatedly until every grain is thoroughly wet. Then cover the heap with clean sacks and allow it to remain thus overnight. Sow the following day, or as soon after as possible.

110. *Why should treated seed be sown as soon after treatment as possible?*

Because if a considerable time elapses between the formalin treatment and the sowing, the germination will be to some extent injured.

111. *Should wheat, oats, and barley be quite ripe before they are reaped?*

Most varieties of wheat and oats should be reaped before they are quite ripe, but barley should be dead ripe.

112. *Should the cereal crop be stooked as soon as reaped?*

If there is an absence of weeds or undergrowth of clover and grasses, it should be stooked at once; but otherwise, if the weather is fine, it is good policy to allow the sheaves to lie on the ground for a few days, as the bottoms of the sheaves dry more quickly when in that position.

113. *In good weather is it possible to get the sheaves dry enough for stacking without stooking?*

Yes.

114. *What are the drawbacks to this procedure?*

There is danger of the sheaves being soaked with rain before they can be stooked, and when carted from the rows as left by the binder the operation is somewhat delayed.

115. *How many sheaves go to make a stook?*

Eight is the correct number.

116. *In what position should the stooks be placed?*

They should be placed with one end to the prevailing wind, or in such a position that the morning sun will dry one side and the afternoon sun the other.

117. *What form should the stooks take?*

The butts of the sheaves should be placed a fair distance apart, so as to ensure a draught right through the stook; while the heads of the sheaves should be firmly pressed together so as to form a sharp top, with the object of throwing off the rain.

118. *During wet weather can anything be done to minimize its bad effects?*

Yes. All fallen or leaning sheaves should be set up, and the whole stook kept as upright as possible.

119. *When dry weather sets in can anything be done to hasten the drying of the sheaves?*

The drying may be greatly accelerated by moving the stooks bodily to a new position.

120 *How may this be done at a minimum outlay of time and labour?*

By means of two light poles, each 6 ft. long, through which, at intervals of 6 in., long nails have been driven, the points protruding about 3 in. Two men grasping opposite ends, one in each hand, place the poles one on

each side of the stook, about half-way down, then press the nails firmly into the sheaves, lift the stook bodily, and place in a new position. Two men can go over several acres in a short time.

121. *In examining sheaves to determine whether they are sufficiently dry for stacking, what part should receive particular attention?*

The hand should be inserted into the sheaf just where the twine is passed round, as, being more compact at this part, it takes longer to dry.

122. *What happens if the crop is stacked in a damp condition?*

The dampness generates considerable heat, which leads to the spoiling of both straw and grain.

123. *How may the heating or sweating be prevented to some extent when the crop is stacked in a damp condition?*

By placing large draining-pipes, in the form of a cross, in the bottom of the stack, a space being left at the point of intersection; and, when building commences, a sack stuffed firmly with hay or straw is placed right in the centre, in an upright position, and as building proceeds the sack is pulled up, leaving a tunnel in the centre of the stack which communicates with the pipes at the bottom and causes a draught. Another lot of pipes should be placed near the eave of the stack.

124. *Is it good policy to stack damp grain in good weather?*

No; this should only be done in very extreme cases—in good weather never.

125. *In building a stack, what are the main essentials?*

That the sheaves be firmly packed and the centre of the stack kept full.

126. *When the body of a stack is ready for topping, what should its shape be?*

It should swell gradually from the bottom upwards, and the centre should be so full that the sheaves on the top of the stack will be kept in a more or less upright position, so as to throw off the rain in the interval between stacking and thatching.

127. *If the centre of the stack is concave before topping-out commences, will a long steep top keep out the rain?*

No kind of top will keep out the rain if the centre is concave.

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE FARM.

PRIMROSE McCONNELL.

FARMERS who have an area of land in mangels should take the storing of them in hand without delay. If fed on the land as they grow they are more or less wasted, and are also very dangerous feed for stock. They should be stored in heaps for at least a month. If this precaution is taken no root is so valuable to the intensive farmer who has a dairy herd or who is raising fat lambs for the early market. They increase the flow of milk very considerably, and are on hand when pasture grass is scarce. One alternative to storing mangels in heaps is to harrow them out two or three weeks before they are required, but this can only be done in districts where there is no danger from frost. The roots will not be injured by a few degrees of frost while they are growing, but when after being pulled or harrowed out they are left lying uncovered they are very susceptible. The tops should be roughly cut off with a sharp hoe and left on the land for ploughing under. It has to be taken into consideration that the mangel crop removes considerable fertility from the soil, but when the tops are ploughed under the loss is to some extent reduced. After the tops are cut off, the roots are simply thrown into the carts and taken direct to the clamps or heaps. The Globe and Tankard varieties are much easier to store than the Long Red and bring up much less soil, although the latter variety is of good feeding-quality. One of the best varieties on the market is Jersey Queen. It is a heavy cropper, of good quality, easy to pull, and comes up very clean. The mangel-clamp should be made in the form of a triangle—not in square heaps—the base being about 8 ft. and the height about 7 ft. In districts where frosts

do not go beyond 10° or 12° a covering of any straw rubbish, or even hedge-trimmings, is sufficient; but where the frosts are severe a covering of soil over the straw is necessary. This may be of a thickness of 6 in. to 12 in. at the base, running to nothing at the apex, which should be completely exposed. It is near the ground where the frost takes effect. After the roots are stored they undergo a rapid chemical change, and in six weeks, or even less, they may be given to all kinds of stock. In leading the mangels to the pastures for cattle and sheep no cutting is necessary —as a matter of fact they are better uncut—and only a certain quantity should be carted out each day. In the case of cows, the roots should be scattered well about, and not left in heaps, so that a greedy cow may have no chance of overgorging herself while she keeps the other members of the herd at a distance. If it is at any time necessary to cart out to-morrow's supply on the previous day, do not give the cows access until the frost that may have happened during the night is entirely cleared away. An overfeed of frosted mangels is extremely dangerous, and may even be fatal. As a cheap winter food for store pigs the mangel has few equals, and if it is pulped and mixed with a little finely chaffed lucerne hay the pigs will be kept in excellent condition. This root is often condemned as being dangerous and costly; but if grown and fed on right lines and certain simple precautions taken it is of very great value indeed. On the other hand, if grown and fed in a "happy-go-lucky" manner good results need not be expected.

Carrots may be stored in a similar manner, except that the clamps should be smaller. This is an excellent root for all stock, their greatest drawback being the cost of pulling. In any case some should always be available for the farm teams during winter, and a few given daily. Many farmers go to the trouble of washing them, but, generally speaking, this is unnecessary. Carrots are, as a rule, grown on light soil, and, when pulled, the little soil that adheres will do no harm whatever.

In feeding off the turnip crop with cattle or sheep the "breaks" should be comparatively small, and as a temporary fence for sheep I would strongly recommend one on the lines of that described in last month's article.

Oat-sowing should be proceeded with whenever the land is in condition, also the sowing of winter wheat. Seed is commanding a high price, but this should not tempt any one to purchase samples of poor quality. It is among the worst of all false farm economies. Neither is it advisable to stint the seeding, as it is quite certain that a comparatively liberal seeding under

good conditions as to cultivation and manuring results in a higher yield and greater freedom from disease. The writer's experience leads him to believe that the old idea of sowing thinly in order to encourage stooling is wrong, because abnormal stooling means a heavy "flag," with much greater susceptibility when attacked by rust.

Chain-harrowing of pastures should not be neglected on any account, and it is an item on the farmer's programme which is not valued as it ought to be. In extreme cases it may even be advantageous to go over the land with the tine harrows in the first instance, and follow with the chains, which should be either of the spike or tripod pattern and fairly heavy. If the land is of a light nature it may also be advisable to use the roller. All wet spots should be drained as far as funds will permit. Farmers may well hesitate before borrowing money, but there are two objects for which this may be safely done—draining and judicious manuring.

Pasture top-dressing may now be taken in hand, and the best results are undoubtedly obtained when a dressing of lime is applied a few weeks previous to the manures, which should be mainly phosphatic. For old pastures the ground burnt lime will give quicker results than the carbonate, because it is more easily washed into the soil. On the other hand, generally speaking, the carbonate or unburnt lime is the best for cultivated soil in New Zealand.

After a dressing of, say, 8 cwt. burnt lime to the old pasture the acid superphosphate will give good results. Failing the lime, the basic super. is better. On clay or peaty soils slag cannot be excelled.

Ploughing for spring crops may be continued whenever the land is dry enough, and it should be as deep as the nature of the subsoil will permit. Clay land should never be ploughed when soaked with rain, as it injures the texture and decreases the yield of the coming crop. The only safe system of ploughing under such conditions is to have each horse walking in the furrow—the injury is then slight.

A green-manure crop, such as mustard, should be ploughed under when coming into flower. Mustard is one of the best green-manure crops to precede potatoes, in which case the land should not be limed; but for other crops it is good policy to apply lime after the green manure is ploughed under, in order to correct the acidity which the mustard generates.

The dairy herd will now be rapidly drying off, but if the members are in good condition a six- to ten-weeks rest between

the lactation-periods is ample. As the cows are dried off they should be separated from those in milk, and kept so until they calve again.

Farmers who have carried out milk-testing during the season will be in a position to cull the "boarder" cows, and it should be done mercilessly. The high price of beef enables this very desirable work to be carried out without serious loss on the original cost, as a good fat cow at the present moment is worth as much as a calver.

Every possible care should be taken of the young dairy heifer calves, and dry feed and shelter given if possible. As to the "dry" system of rearing calves, any one sceptical of its advantages will be easily convinced by visiting the calf herd at the Ruakura Farm of Instruction.

Care should be taken that teams doing hard work be supplied with collars of a suitable size, and well padded where the pressure is greatest. Many New-Zealand-made collars become quite flat after being only a short time in use. When feeding at midday the collars should be removed, especially when the horses have to eat from a nosebag. Any chafing with the chains should be at once seen to: it is the trade-mark of the careless teamsman. Mares in foal should always have swingletrees of an extra width.

Nothing keeps the shoulders in good condition like cleanliness.

Half-clipping is as good as half a feed of oats a day, and should never be omitted. Unclipped horses doing hard work at this time of year are never dry, and are in continual discomfort.

THE ORCHARD.

J. A. CAMPBELL.

THERE is always abundance of work during the dormant season to keep the orchardist well occupied, and although the period is a fairly long one it must always be remembered that there is a lot to do that cannot be done at any other time of the year. Full advantage should be taken of the early part of the season and as much work as possible should be done during this month. Weather-conditions are always unreliable, and other interruptions are sure to take place. This often results in the time at the orchardist's disposal being only too short, and causes an unsatisfactory rush of work towards the end of the season.

Now is the time for a general renovation and clearing-up of the orchard. In addition to pruning, spraying, planting, and cultivating, there are hedges, drains, and many other like matters to be attended to, and now is the time to get busy with the work.

Many of the orchard diseases which cause so much trouble during the summer, such as red mite, woolly aphis, mussel and San Jose scale, can now be more satisfactorily dealt with.

In connection with spraying it must always be remembered that thoroughness is absolutely essential to success. This applies with equal force no matter what class of spray is used or at what season of the year the spraying is done. Most of our spraying-compounds will do the work satisfactorily if given a chance. Many of the past failures have been due more to the man directing the nozzle than to the material used. Take the spray-rod in both hands, as it were, and get to work as though you intended to accomplish something. Saturate the whole of the tree, using a pressure of 120 lb. to 150 lb., or even more, in order to drive the spray well in. Have a directing-rod at least 8 ft. long fitted to the hose, having an angle nozzle attached. If this method fails and the spraying has been carried out at the right time, you can then begin to blame the material used.

PEACH-SPRAYING.

To successfully control fungus diseases attacking the peach the tree should be sprayed with a fungicide twice during the dormant season, instead of once as is commonly practised. The time for the first application is as soon as the foliage falls or before the first winter rains set in. This application is for the purpose of checking the ravages of "die-back" (*Clasterosporium carpophilum*). This disease is the cause of most of the dead twigs to be found in the tree. It also causes the falling of buds and the cracking of the bark, which defects are often erroneously thought to be caused by oil-spray scorch. The winter formula of the Bordeaux mixture is the best remedy for this disease, and should be used when the tree is affected with this disease alone, but if it be also affected with red mite, San Jose scale, &c., the use of commercial lime-sulphur is the more advantageous, as it is an insecticide as well as a fungicide. Whilst probably not equal to the oil sprays for the winter control of all insect pests, it is quite effective when used at 1–15 for San Jose scale, and it will also materially assist the oil spray, which should be applied later for the control of red mite. This order may be reversed by using the Bordeaux mixture for the first spraying, oil in midwinter, following with lime-sulphur during August to strengthen the work of the oil spray and to control leaf-curl, which it appears to do satisfactorily at 1–15 to 1–20.

INSECT PESTS.

Red Mite.—To control this pest oil emulsion should be used. For pip-fruits the 1–15 formula should be applied, and for stone-fruits the 1–17.

Mealy Bug.—This pest is very much on the increase, and is often mistaken for woolly aphis. It is usually to be found attacking the stem end of the apple, particularly when the stem is short, and also the blossom end of the pear. It is a difficult pest to control during the summer, being then well protected by the fruit and foliage of the tree. It should therefore be thoroughly dealt with in the dormant season, and for this purpose emulsified oil at the rate of 1–15 should be used.

San Jose Scale.—This can safely be taken to be one of the worst forms of scale insects which affect fruit-trees, owing to the marvellous rapidity with which it increases and spreads from tree to tree and from orchard to orchard during the summer months, and the disastrous effect it has on the tree, especially on stone-fruits, whole branches of which are killed off in a single season. If it is left unchecked many trees are ruined by the end of the second season.

Although this pest is much easier destroyed by spraying than is mussel scale, the work must be thoroughly done, as small affected parts left unsprayed are sufficient to renew the attack, and by the end of the season the trees will be almost as badly affected as before. This disease cannot be successfully dealt with in the summer, therefore winter spraying should be very thorough. For pip-fruits spray with oil emulsion, 1–15 to 1–17, or with lime-sulphur, 1–12 to 1–15; and for stone-fruits, oil emulsion, 1–17, or lime-sulphur, 1–15 to 1–20, should be applied. In either case the oil is preferable.

Mussel Scale.—To control this pest oil emulsion should be used at a strength of 1–12 for pip-fruits and 1–17 for stone-fruits.

Woolly Aphis.—Trees that are not receiving two weak oil sprayings in autumn and late winter should be sprayed with oil emulsion, 1–15 to 1–17. This spray should be applied at a high pressure and at short range in order to thoroughly penetrate the canker-like growths on the tree affected with the aphis. Where practicable affected trees should be hand-painted—that is, use 1–1 oil emulsion, and apply it to the affected parts of the tree with a stiff brush. This method applies particularly to young trees. It is a very simple and sure means of keeping the disease well under control, and if carefully carried out will no doubt save considerable trouble and expense later.

PLANTING.

Where the land has been properly prepared and the soil is not waterlogged fruit-trees can be planted out during this month. Should the soil not be in a suitable condition for planting when the trees come to hand, they should be carefully heeled in until more favourable conditions obtain. Young trees are often more or less affected with red mite, scale, woolly aphis, &c., when received from the nursery. Although most nurserymen treat their trees for these troubles before sending them out, it is advisable to make doubly sure by repeating the treatment again in the orchard before planting. The process is simple, and may, particularly if the situation of the orchard is at all isolated, result in little trouble being caused by these pests for some considerable time. All that is required is a barrel of oil emulsion, diluted to 1–17. Plunge the trees in this, having all but the roots covered. When dry, heel in or plant. If the trees are not being planted till the autumn, dip them a second time in the same manner, this time using Bordeaux mixture, winter strength, or the lime-sulphur solution.

CULTIVATION.

Autumn or early winter cultivation is a decided advantage to the orchard, especially in those localities which have moderate rainfall. The breaking-up of the surface soil with the plough allows of the freer access of moisture to the subsoil, and full advantage of the winter rains is thus gained, while better provision is also made for the ready drainage of the surplus in the event of heavy rainfalls. Besides, full advantage is gained of the beneficial effect of air and frosts on the soil. In some localities and situations, however, such as hillside slopes composed of light soil, it may be inadvisable to plough at this season of the year owing to the danger of washing out, often resulting in the loss of a considerable amount of plant-food. Under such conditions the ploughing should be deferred till early spring.

One objection raised against autumn ploughing is the increased difficulty of carrying out the work of pruning and spraying over ploughed ground. On account of this the ploughing should be done as late in the season as the weather is likely to allow, in order that as much as possible of the work of the orchard can be done beforehand. In any case, where conditions allow, the advantages of doing the work of the orchard before ploughing will be found to fully compensate for any disadvantages.

The ploughing should be done towards the trees, leaving a furrow down the middle between the rows.

THE POULTRY-YARD.

F. C. BROWN.

IT is only to be expected in a season like the present, with foodstuffs at abnormal prices and poultrymen in general looking for means to reduce the high cost of production, that unsatisfactory results should be recorded in very many instances. The birds have been hatched at the right time, but they have either failed to lay as soon as they should have (notwithstanding the exceptionally favourable season from a weather viewpoint), or have gone into a false moult just when it was thought they had settled down to a prolific laying season. I have been besieged with letters from *Journal* subscribers who have been quite at a loss to account for their disappointments. Without seeing the birds or making a close examination of the methods of management from the shell to maturity it has been a simple matter to determine the cause. In a normal season the poultryman appreciates the importance of good feeding, especially for growing stock, and no radical alteration in the diet; but with the main foodstuffs soaring to a high level he is naturally inclined to economize at the wrong end, while he is apt to lend a willing ear to the advice of neighbours and others who have some new idea on feeding poultry by cheap substitutes without interfering with the egg-supply. Reducing the food-supply and repeatedly testing new systems of feeding obviously leads to postponement of the commencement of the laying-period and, when laying has started, to false moults and a consequently poor egg-supply.

The important subject of reducing the cost of production is one that should be approached with the utmost care. It is much easier to lessen the cost of labour in feeding poultry than to lessen the cost by introducing substitutes for the common constituents of a fowl's diet, particularly wheat. This is not to say that the cost of feeding fowls cannot be reduced. In many cases I believe it can be, principally in the direction of supplying good green stuff in abundance and by a liberal meat ration; but this lowering of cost is much more easily accomplished in the warmer months of the year, the fowl's more natural laying season.

I have said that a good supply of meat (or even a substitute of this) is desirable, but this does not mean providing this highly nitrogenous concentrate in such abundance that it has to largely take the place of grain. In other words, good green stuff and meat given in sufficient supply—provided in such a form that the birds can take just what they want of these without being forced

to eat more than nature demands—are an excellent means of reducing the fowls' demand for grain food. A very common mistake made is to think that all grain is alike—that cheap defective wheat and low-grade oats, barley, &c., are economical. The food-value of these is almost invariably in direct proportion to their cost, and it is generally the case that the best grades of grain are the cheapest in the long-run, for, given all the green stuff and meat desired by the bird, it will satisfy itself with a much smaller proportion of good-quality grain than it will with a cheap grade. The waste also is often considerably less, with the better-quality article; indeed, cheap grain for poultry is false economy in its worst form. Quality rather than quantity should always be the objective in deciding on a ration for the layer.

In some cases poor egg-returns are causing dissatisfaction, probably because the amount of the egg-yield is much more keenly watched at the present time. The dissatisfaction would be far less general had the advice given before in these notes been heeded—viz., to cull out the old birds and to depend on the pullets. It is only the exceptional hen that is laying at the present time, and almost invariably this is the bird that has not yet moulted and consequently the best bird for the breeding-pen, especially if given a rest when her laying season does end, and if she be then fed well on a non-forcing diet and be given opportunity to exercise and build up her vigour before being placed in the breeding-pen. Where all the early moulters have been disposed of it will assuredly prove to be a great saving. Of course, where these have been retained up to the present time they may just as well be kept on, as they should be commencing to lay within the next month or two, providing they have been well treated in the direction of good housing and feeding, a necessary feature of the latter being a plentiful supply of green stuff and a good but non-forcing diet. Of course, when approaching their next laying season meat should form an important item of their diet.

It would be amusing, were it not so serious a matter, to read in several letters from inquirers that potatoes and pollard form the bulk of the fowl-food and that the egg-yield is unsatisfactory. In one case a correspondent was rather indignant when I suggested that perhaps his hens, which were laying very poorly, were not being fed well enough. He said they were getting as much as they could eat; but when pressed for information as to their diet he said they were living principally on fruit, having the full run of an orchard and being allowed to eat the windfalls. Of course the case is most exceptional. Fortunately, the great majority of our poultrymen realize that if eggs are to be secured, especially in

winter, the fowls must be fed well on suitable foodstuffs. The common mistake is in expecting low-grade grains, &c., to be satisfactory and in experimenting with the object of discovering a cheap ration.

Now that the breeding season is in front of us it is well to emphasize that if poultrymen are to keep the New Zealand market to themselves they will have to depend more and more on the pullet, so that a big supply of eggs may be available in the off season. The higher the price of the local egg at this time of the year the greater will be the inducement for American and other egg-producers to cater to this market in their cheap seasons. At the present time American eggs are being imported by the thousands of dozens. Though many of these are of indifferent quality they are being retailed as a local product at a handsome profit. The local demand requires a larger supply of eggs in the autumn and winter months, and unless the demand can be met by New Zealand producers it will be impossible to keep out the foreign article. This is not to say that cheap eggs should be produced in the winter months, but rather that the summer surplus should be placed in proper cool storage for winter use for the business of the confectioner and others. By means of a proper system of cool storage there would be brought about a more uniform retail price for eggs throughout the year, thereby encouraging greater consumption. The winter price would be reduced, but the summer rate would be increased, and it is an increase in the price of the summer egg, which is produced in the greater abundance, which is most to be desired.

WORMS.

Quite a common trouble at the present time, especially where fowls are being kept on the intensive system, is intestinal worms. Though birds of exceptional vitality may lay fairly well when affected by this trouble, the weak members of the flock will generally succumb. In all cases the trouble, if allowed to continue, means serious loss and a reduced egg-yield. The presence of these worms is commonly indicated by the birds making a screeching noise, which is often confused with the indication of a throat trouble, a sound very similar to that made by a seagull. There are many methods of treatment, but perhaps the most simple, and one that is rapidly effective, is to starve the affected birds for a day and then give them a dose of Epsom-salt—say, a 1 oz. packet for every bird, dissolving this in the water with which the mash is mixed, adding also to the mash some sulphur (about the same amount as the salts), which should be thoroughly well mixed with

the ingredients before these are moistened. The effect of this diet given after a fast will be to expel the worms. Care must be taken to clean up the droppings after the treatment and effectively destroy these. It is therefore well to confine the affected birds during treatment in a small space so that the cleaning-up process may be properly carried out and further risk of infection thereby nullified. Where the treatment has not been found to be efficacious it should be repeated in a week's time. It is advisable to give the houses where the affected birds have been located a thorough cleaning-out, spraying with a strong disinfectant, and using a powerful sprayer so that every corner and crevice may be reached. The runs should be turned over and well limed, sowing these down with grass so that they may be freshened up as much as possible.

COLDS.

Many inquiries have reached me in regard to colds in young stock, especially those that are late-hatched. Invariably the trouble has been caused by draughts in the roosting-quarters or insufficient ventilation in a stuffy, closed-in house. When it is noticed that dust and dirt are adhering to the nostrils it is a safe indication that the birds have contracted a cold, the nasal discharge causing the dust or dirt to adhere. Prevention, of course, is always better than remedial treatment, but where the trouble has made its appearance the latter is, of course, necessary. Prompt measures should be taken, for too often the neglected cold develops into the dangerous roup. Affected birds should be at once isolated, and placed in the most comfortable but most healthy quarters. The best treatment is probably holding the beak in kerosene in such a way that the nostril is submerged, and keeping the bird in this position till it breathes. The kerosene will then be drawn to the seat of the trouble. This should effect a cure after several applications. Before treatment any adhering matter should be removed from the nostrils, while after each operation any kerosene remaining on the beak should be wiped off with a dry cloth, care being always taken that no kerosene gets on the face, as, if it does, blistering will probably follow. A little Condy's crystals may also be placed in the drinking-water, about as much as will go on a threepenny-piece to 2 quarts of water. All the drinking-water may be thus treated in a season of the year when colds are probable.

CALIFORNIAN TABLE-POULTRY MARKET.

Writing from San Francisco, under date of the 22nd March, on the table-poultry trade in California, the New Zealand Trade Commis-

sioner, Mr. E. Clifton, said, "It is with satisfaction it was noted that there will be but small quantities of poultry coming forward. There cannot be a market of any importance for poultry in California. It is observed that the Australian Commissioner received quite a large consignment, and that he had considerable difficulty in the disposal of it."

THINGS TO REMEMBER.

One of the most serious leaks in poultry-keeping is the retaining of cockerels after they have reached a marketable age.

Fresh air is a necessity at every stage of a bird's life.

Watercress is a valuable tonic and food for fowls, and is in reach of many poultry-keepers who never use it.

Changes of food and quarters are frequent causes of pullets going into an early moult.

There is no black art in breeding poultry. The fundamental rules in breeding apply to poultry as to all other classes of live-stock.

Owing to the high cost of feed many flocks are being kept in a half-starved condition. This is not only unprofitable but is cruel. Better send them to market.

A hen found above the normal average weight of the bird indicates that the egg-laying power is not what it should be, and that she should be culled.

THE APIARY.

F. A. JACOBSEN.

At this season of the year, extracting and all the necessary work in connection with an apiary having been completed, beekeepers are at liberty to take their annual vacation.

It is well, however, to emphasize the numerous duties that remain to be carried out during the winter months, chief of which is to map out a plan for the coming season. Beekeeping is a business where system counts, and those who have not considered the question would find it to their advantage to give the matter some attention. Map out the work in detail, the number of queens required, the method to be employed if increase is desired, the system of swarm-prevention, and everything necessary to the well-

being and profitable working of the apiary. The necessity of a plan of this kind is not sufficiently recognized, some preferring to order as necessity demands, and to these I would point out that success is the wages of diligence and systematic work.

Now you have time to spare to do the many little things which, if postponed for a busier period, may be neglected altogether. Do you have old hives that need repairing? Then, do it now. Painting and otherwise preserving the plant can be done in the off season with great advantage. In beekeeping everything must be done in its due season without delay.

Every beekeeper should be an experimenter in a small way, and thus obtain knowledge of methods most suitable for varying seasons in his particular location.

Study each colony separately, and breed from queens showing purity of strain, prolificacy, and gentleness, combined with superior honey-gathering qualities. Also select queens of this kind for producing drones, and curtail drone-breeding to a minimum in other hives, thus securing a greater chance of a more suitable sire for future generations. Nature has taught us that the quality of the sire has a very great influence on the progeny, and the above is the only method in apiculture whereby desirable characteristics on the male side can be secured. I would urge all beekeepers to give this matter their earnest attention, as it is one of great importance if we are to advance on sound lines.

Nothing further need be said this month, but, knowing beekeepers so well, I might add, "Don't put off until to-morrow what you can do to-day."

THE FARM GARDEN.

W. H. TAYLOR.

VEGETABLE-CULTURE.

EVERY opportunity should be taken to improve the soil. For the next few months rain is frequent in most parts, and the soil, being softened, is easily worked. Deep working is an absolute necessity in successful gardening. If the subsoil is hard it holds water in winter. Water excludes air, and makes the soil what is termed "sour." Roots will not go down into the water, consequently they have only the surface soil to work in, and there they are subject to the influence of every change of weather. Where water lies

near the surface the soil is made cold, partly by the presence of the water and partly by evaporation, which is excessive in badly drained soil. Drainage and deep working lowers the level of the water in winter and renders the soil fit for the roots to work in, consequently they get farther from the surface, find more nourishment, and are less influenced by the weather-conditions. Growth is in consequence much stronger and more certain. It is just as important to trench very dry ground. Where the soil is naturally very dry, or where there are deficient rainfalls, that is the place of all others where deep tillage is prolific in results. Such places are entirely dependent on rainfall or watering, and if the rainfall is deficient it will require a large amount of water to supply their want. Often enough there is no water for the purpose, and in any case watering is very often futile when the roots are near the surface, as evaporation is so very rapid. All experienced men know the value of deep cultivation. All real gardeners know that watering can never take the place of trenching. Vegetables grown in deep soil are beyond compare in superiority to those grown by watering on shallow soil, and the result is far more certain. In a climate that is hot and dry, deep cultivation may afford the only hope of success. If a place lies low and is sheltered watering may do, but if it is exposed it will not. Deep rooting, so that the roots are not easily affected by the sun, is the result to aim for. Deeply worked soil holds a reserve of moisture, and roots in going down after it are less affected by sun and wind than is the case when they are near the surface. The depth of trenching should depend to some extent on the character of the subsoil. It would be useless to trench deep through stiff clay or through loose gravel unless something were trenched in to alter the physical conditions of such soil; but if this could be done the trench may be as deep as any one would be likely to make it, and would be a certain benefit. Under ordinary conditions 30 in. to 36 in. is a useful depth. Almost any rubbish may be trenched in. Road-parings are particularly good if the subsoil is bad, as they contain a large proportion of imperishable material. Every kind of garden rubbish may be utilized, and, of course, every kind of manure. Woody trimmings of trees and shrubs should be burned and the ashes carefully saved, as they are rich in potash, and are valuable for most garden purposes, particularly for fruit-trees and onions. It is highly important that the ashes be kept dry, for if rain falls on them much of the potash is leached out. Fowl-manure should be kept dry. If it is kept in a dry place and mixed with a little dry earth it soon turns into an almost odourless powder. All its fertilizing-powers

are retained. It can in this state be spread on the ground in an economical manner.

Asparagus.—Ground for new beds should be got ready at once, so that if it is deeply trenched it may have time to settle and sweeten before planting. The proper time to plant is just as the plants begin to grow. Asparagus is deep-rooting, therefore the soil should be trenched, and drained if necessary, as it will not thrive in wet ground. Liberal quantities of manure should be worked in, though the quantity need not be extravagant, as growth is not very strong the first season, and it can be given in after-years by top-dressing. It is important to secure a condition of soil that will encourage a free run of roots. If the soil is stiff, add anything that may be available to alter that condition. Road-sand, sea-sand (if free from broken shells), ashes from rubbish-fires, and vegetable-mould are all suitable. Be sure to avoid the use of sea-sand with broken shell in it, for the sharp shell cuts the stems. Old beds should be cut down if this is not yet done. Cut level with the soil, and give a good top-dressing of manure, to be washed in by winter rain. Nothing more is required at present. Salt and nitrate of soda are good for asparagus, but neither should be applied till near starting-time, as they leach through the soil quickly if rain falls on it. Where the old form of narrow beds is employed a few inches of the top soil should be raked off before applying the manure, and this should be left off till spring. Wood-ashes is a good fertilizer, and a good dressing of this substance is useful. The crowns rise a bit, and the ashes help to keep them covered.

Seakale may be covered for forcing at any time during the dormant season. Dust round the plants with lime and soot before covering. Fresh lime will kill any slugs there may be present, and soot will tend to ward off wireworms, which will injure the crowns if they get in.

Cabbage, Cauliflower, Lettuce.—In most places the plants from seeds sown at the end of March or early in April will be ready to plant at the end of May or some part of June, according to the district. They should be planted when large enough, but it will pay to wait for them if they are not ready, rather than to put out larger plants, which are very liable to run to seed. At times there is some trouble to prevent bolting in the true earlies. It is the habit of maturing quickly that constitutes an early variety. They are affected to a great extent by the weather and the condition of soil. If the soil is kind and the weather has a good share of growing-days all may be well; but if the soil is sticky and the weather hostile growth may lag, and it is then that the danger comes. Keep the soil as open as possible by working, so as to

admit air and warmth from the sun, and when the plants get a good start give a dressing of nitrate of soda—2 oz. to the square yard. Refrain from top-dressing with stable manure and, unless in exceptionally light soil, from watering with liquid stable manure. These methods are sufficient to ensure good growth. Early cabbages, being small, may be planted 18 in. by 20 in. apart, early cauliflowers 2 ft. apart, and later cauliflowers 30 in. by 36 in. Two kinds of cauliflower should be planted—an early, such as Snowball or Early London, to come into use early in November or in some places a little earlier, lasting till near Christmas, and Early Erfurt, Metropole, or a similar large kind, to succeed the earlies.

Lettuces may be planted as soon as the plants are big enough. They make more rapid progress when planted out, not being in competition with each other as they are in the seed-bed.

Spinach should be thinned to stand at least 9 in. apart. This is the only way to ensure good leaves. If the soil is trodden flat when gathering, break up the surface.

Carrots, parsnips, and *Jerusalem artichokes* should be left in the ground. When digging parsnips for use, lift the crop as it comes, and dig clean. Any roots that are not large enough for use should be thrown aside, so that they may be carted off. If they are dug in, no matter how small they may be cut up, they will always sprout up again, and will prove a nuisance, it being necessary in the end to dig them out. If they sprout up in a line of seedling onions or any similar crop, the nuisance is a serious one. If there is no other use for them, put them at the bottom of soil being trenched, where they will be safer and will do good, as will any other perishable garden rubbish. Indeed, it is a good plan to have a trench always open at this time of the year, where trimmings of carrots, &c., can be disposed of, covering up when enough is in by opening up another trench. The remnants of French beans, cabbage, and cauliflower stumps, &c., can be used in this way.

The ground now occupied by *celery* will grow the best of peas next season, the ground being deeply trenched and well manured. Prize roots of parsnips can be grown on such ground without addition of manure. The proper way to prepare for either crop is the good old way of digging the celery in such a way as to bury the trimmings of each head when dug, leaving the ground flat. It then settles nicely, is easily kept clean, and the debris of the celery decays, instead of laying around to harbour and breed slugs and wireworms.

Peas.—In many places it is wise to sow peas during May. The last week of the month is usually chosen. In places where the spring is good, and the soil good, and rainfall plentiful I have not

seen much advantage in the practice. Where soil is heavy and the winter is very wet, and is followed by a late spring, sowing in May is useless, for the plants only languish and do no good. There are, however, places where the soil becomes dry early, where rainfall is light and the climate hot. In such places autumn sowing is a good practice. It is usual to sow only dwarf varieties at this time, but this is a mistake. Tall varieties, supported by sticks, would give better returns; not that dwarfs should be neglected, but they should be in addition to the tall varieties. When rainfall is plentiful during the period of short days the haulm is likely to get mildewed, and in hugging the damp soil it harbours slugs. The taller varieties supported by sticks are not liable to either disadvantage. I may say that it would pay well to give sticks, where they can be secured, even to dwarfs at this time, for not only are slugs then easily controlled, but birds do little harm to peas so supported, and the produce is materially improved.

THE FLOWER-GARDEN.

Remarks about trenching and draining for vegetable-culture are applicable to the flower-garden. When a flower-garden is to be laid out the first thing to consider is drainage. This should, as a rule, precede other work. If a block is to be laid out in borders, beds, lawns, and paths, the whole site should be drained. Paths become solid, and lawns are made firm by rolling or the necessary work and trampling. Unless the whole is drained the solid parts may become dams to hold the water back, which they surely will if the soil is anything but very light and porous, and proper drainage is not provided. The major part of the borders, &c., may be dry enough, but the margins, where small plants are grown, are sure to be wet in the rainy season and very dry in summer. Good drainage is a benefit in many ways. The soil is easily worked and is sweet, lawns grow good grass instead of weeds and moss, and paths are dry to walk on and grow a minimum of weeds. Regarding paths: It is not sufficient to lay gravel on existing soil—8 in. or 10 in. should be dug out, and the space filled with coarse rubble. Such paths are easily kept clean, and are pleasant to walk on. The extra cost of making is soon saved by the ease with which they are kept. On country homesteads, where there are many pastoral duties to take up time, a place is often marred because it has been laid out in a manner the keeping of which involves more time than can be spared. Beds and borders neglected become a source of annoyance rather than of pleasure, and the place looks neglected, although a lot of

time may be spent on it, and as time goes on it gets worse. There is nothing that looks so refreshing as grass, and grass will bear neglect without looking untidy, for long grass is not unsightly, and mowing puts it right again. I consider the very best way to lay out such places is to put them down in grass, and plant trees and shrubs upon it. A bed may be made here and there if time can be found to keep them. Such places are easily kept, and look well at all times. There should be no borders, as they are generally understood, but grass everywhere, with, as said before, trees and shrubs dotted about according to taste. Gardens of this kind are apparently more extensive than they in reality are, because every part is open to walk on.

Some discrimination is necessary in choosing shrubs or trees or they may prove to be out of place. Their ultimate growth should be considered. *Norfolk Island pines* are suitable for large places only, and if the lower limbs are cut off so as to be able to walk under them they are spoiled. The *pohutukawa* is a good tree, because it makes a broad head without covering much ground at its base. *Pampas-grass* is nice on grass—better there than anywhere—but keep it well away from a path, as its leaves have sharp edges, which will cut the hands or face. Weeping trees, *lime*, *ash*, *elm*, and *purple-beech* are beautiful, and when they grow up a seat can be placed beneath them. *Mulberry-trees* are good for the same reason, though not weeping in the true sense. On grass is the proper place for mulberry-trees, as the fruit is at its best when it falls dead-ripe, and on grass it gathers no grit. *Evergreen oak* is one of the finest of lawn trees, but is not often seen. I have memories of it and the *tulip-tree* and *Paulownia imperialis*. What is better than these? In fact, there is a wealth of good things that are exactly in their right place when over grass.

Of the smaller shrubs there are many. Preference should be given to flowering-shrubs, because there are no borders. Our native *clianthus* is good in its season, as are also *deutzias* of the larger types (such as Pride of Rochester), *Scabra*, *Crenata flore pleno*, *Ceanothus*, *Choisya ternata*, *Buddleia variabilis*, and similar species, and *Prunus pissardi*, and particularly flowering peaches and cherries. I might go on enumerating *ad infinitum*.

I would not suggest a garden with no flower-beds; what I suggest is the elimination of the mixed border, which is too often filled more or less with rubbish and the aforesaid weeds. Make a place that looks well even when a bit neglected, and add a few beds as time can be found to grow *bulbs*. We cannot do without the bulbs, and also *carnations*, *pentstemons*, and other enduring

plants. Some ground could usually be found in a less conspicuous place to grow *dahlias*, *sweet-peas*, and annuals. A strip in the vegetable garden would be best of all, and would make those quarters attractive.

Many herbaceous plants become dormant. Be careful to mark the site of those that die down, as a wrong stroke with a spade may ruin the choicest. Label all such with the name distinctly written. A little heap of clean sand on a clump of *dielytra* and similar plants will make their presence more noticeable and keep weeds from growing above them. Autumn-flowering *gladioli* should not be left in the ground. They deteriorate rapidly unless given a thorough rest. They do not die, but revert back to the original type. Take them up, and store in a dry place, and replant during August. All spring-flowering bulbs should be in the ground by now. Lilies should not be disturbed unless they have been planted three or four years. They become crowded in that time, and should be separated. They seldom do their best the first year after planting.

Cuttings of shrubby *calceolaria*, *pentstemons*, and the tall *ageratum:* The dwarf varieties of ageratum are raised from seed in spring. The tall variety is useful for mixed planting in borders, and is useful for supplying cut flowers. Cuttings of shoots that have not flowered, made about 4 in. long, root freely in ordinary garden soil; so also do pentstemon cuttings, from 3 in. to 4 in. long, of side shoots that have not flowered. Calceolaria cuttings about 3 in. long should be inserted just clear of each other in ordinary soil surfaced with sand. The position should be shady during the greater part of the day. The site of the cutting-bed should be cool.

THE YOUNG PEACH ORCHARD AT THE RUAKURA FARM OF INSTRUCTION.

THE HEMP INDUSTRY.

W. H. FERRIS.

In those districts subject to frost some millers have wisely ceased operations for the winter months. In a number of instances, especially where operations were commenced late in the season, cutting is still going on. This will probably, however, prove a costly policy, as I have already inspected swamps where frost has affected the young shoots of recently harvested flax, which may not improbably fail to recover with frost following on frost. With the present very satisfactory ruling prices it is a decided temptation to continue milling, but if a future season's leaf-supply is to suffer in the process the wisdom of the procedure is decidedly problematical.

Due no doubt to the fact that there is now only £1 a ton difference in market value between low-point good-fair and high-point fair parcels, the quality of fibre which reached the grading-stores last month showed a decided decline. It is a matter for regret that inferior quality should be thus deliberately aimed at, especially as there is an undoubtedly fine profit in the ruling values of the higher grades. There may be a little saving in aiming at lower quality by rushing the milling processes, but it is distinctly bad for the industry, especially at a time when there is an opportunity to introduce the higher grades to the notice of oversea manufacturers, and when it is a comparatively easy matter to secure the better quality by reason of the leaf available being healthy and sound. A few Manawatu millers and practically all the Wairarapa and Marlborough millers are producing fibre of good quality, and are thus maintaining the good standard set in the earlier part of this season for New Zealand fibre.

Millers are still exhibiting a tendency to make their plants thoroughly up to date and to maintain their swamps in good order. Considerable work is to be done this winter in introducing up-to-date appliances and in making drainage more effective. A new mill is being erected at Rangitane, between Palmerston North and Foxton, on the most approved principles. It will be of four-stripper capacity, and will cost about £10,000.

Mr. A. W. Hall, who has been a member of the grading staff for two years, and who will be remembered as having been in charge of the first installation of New Zealand machinery for dressing phormium-fibre on the Island of St. Helena, has resigned from the Government service to again enter into the flax-milling business in the Southland district.

AGRICULTURE ABROAD.

EUROPEAN METHODS OF POTATO-CULTURE.

MR. EUGENE GRUBB, of Colorado, author of a valuable treatise on potatoes, who has just returned from abroad, spoke entertainingly on potato-culture in Europe at the Potato Session of the recent Los Angeles Fruitgrowers' Convention. There, he said, the potato is much more important than here. It may almost be said to stand between the people and famine. The growers in Europe insist on a long rotation as absolutely necessary to keep the tubers free from disease. They invariably precede potatoes with grass, often ten years separating potato crops, grass, grains, and other vegetables filling out the rotation. The great crops of potatoes in Europe are due to clean soil and selected seed, which is sound and of selected varieties. Only immature seed is used there, and only whole potatoes are planted, as a cut surface invites infection. Care is requisite to never bruise the tubers or sprouts. Sprouting in especially prepared boxes, kept in special buildings, serves a double purpose by hastening development and giving less time for attacks of fungus or bacterial pests. In Europe potatoes for seed are usually grown by a specialist. We should follow this example in America. Mr. Grubb stated that by adopting in full the methods now practised in Europe it would be possible not only to double, even triple, our yield of potatoes, but also to lessen the time of growth and development by at least fifty days, clearly to our advantage.—*The Monthly Bulletin of the Californian State Commission of Horticulture.*

REARING PIGS IN MOVABLE PENS.

M. Hvenegaard, Buenos Aires, from the Bulletin of the International Institute of Agriculture.

THE writer has obtained very good results in the Argentine with a system of rearing pigs in movable pens; he has obtained an average of twelve pigs per sow per annum with a herd of 1,000 sows.

The pen measures 9 ft. 9 in. by 6 ft. 6 in., and is 2 ft. 9 in. high; it is made of six 2 in. by 3 in. uprights, to which are nailed four rows of 1 in. by 3 in. bars, 7½ in. apart; shelter is provided by a piece of corrugated iron at one end sloping from the top bar to the second bar and by two other pieces fixed to the lower three bars below it. The 7½ in. space allows the young pigs to pass to and fro. A trough of 5-gallons capacity is placed in each pen. The cost of such a pen does not exceed 15 pesos (about 26s.).

The pens are placed in lucerne-fields 20 yards apart, in rows 120 yards apart. Litters of different ages should not be allowed in the same row, or the bigger ones will enter the pens of the younger and interfere with their sucking. When breeding is carried out all through the year, 100 pens are sufficient for 300 sows. After the pigs are weaned the sows are allowed to pasture with the boar (one boar for each twenty-five to thirty sows), and the sows near farrowing are removed to the pens each week.

The pens are moved each day to provide fresh clean pasture; three men can move 100 pens in an hour. Fresh water is supplied each morning, and about 7 lb. of maize is allowed each sow in the afternoon. Weaning takes place at the age of two and a half to three months, and to simplify the work it is better to wean those of a row at the same time. After weaning the males are castrated, and all are marked and given an insecticidal bath. They are then put out to pasture until one year old.

At least one shed 25 yards by 6 yards should be provided for every 1,000 pigs to afford them shelter in bad weather. From ¾ lb. to 1 lb. of maize per head is allowed daily. At one year old they should weigh about 110 lb. to 150 lb.; they may then be fattened if desired by turning them into a maize-field. With a good crop of maize 250 acres will fatten 1,000 pigs in two to four months. During this period the fattest are chosen and sent to the market. If possible, the crops should be arranged so that the lucerne-fields surround the maize crop, thus enabling the pigs to prevent an attack of locusts.

The economics of this system under Argentine conditions are as follows (taking the dollar at 1s. 9d.):—

	£
Capital expenditure—	
6,200 acres, at about £5 12s.	35,000
Buildings, &c.	8,750
1,000 sows, at £3 10s.	3,500
Forty boars, at £8 15s.	350
First year's expenses	6,562
Total	£54,162
Annual expenditure—	
Interest on capital, at 8 per cent.	4,333
Labour: eight or ten peons (labourers)	875
Maize for rearing purposes	3,500
Cultivation of 2,200 acres of maize for fattening	1,312
Sundry expenses	1,355
Total	£11,375
Receipts—	
10,000 pigs, weighing 220 lb. each	29,875
Profit	£17,500

INTERNATIONAL INSTITUTE OF AGRICULTURE.

From the *Journal of the Board of Agriculture.*

THE new session of the Institute was opened by a meeting of the Permanent Committee on the 31st October, which was followed by a second meeting on the 7th November. At the first meeting the President, the Marquis Cappelli (the representative of Italy), urged upon the delegates, and especially upon those who represent States now at war with each other, the duty that lies upon them in the present circumstances of working together with the single aim of accomplishing the beneficent objects of the Institute, so as to give the world the most accurate information possible regarding the outturn of, and trade in, agricultural produce, and aid the countries devastated by war to re-establish their means of production as soon as the war is over. He also announced that the Senate and House of Representatives of the United States had passed a joint resolution instructing

their delegates to request the Permanent Committee to take steps to call together an international conference to consider the advisability of drawing up a convention for the establishment of an International Commerce Commission, having consulative, deliberative, and advisory powers regarding ocean trade and ocean freights, with the object of giving greater stability to the prices of agricultural produce throughout the world. It was decided to defer discussion of this important motion until Mr. Lubin (the United States representative) was himself able to be present.

The General Secretary presented a report on the working of the Institute during the vacation then ended, and gave an account of the difficulties which had been experienced, owing to the outbreak of war, in carrying on its regular duties. Of the hundred or so members of the permanent staff, who are drawn from many different countries, altogether eighteen had been summoned to military service under their respective flags. Besides this, there had been a great falling-off in the amount of material available, in the shape of statistics and reports, for the preparation of the monthly bulletins. Everything possible had been done, however, to continue the work, and to publish bulletins with all the information available and with the least possible delay.

Careful consideration was given to the financial position of the Institute, which is temporarily embarrassed owing to delay on the part of several of the adhering Governments in paying the contributions due from them for the calendar year 1914; but as there is reason to expect that most of them will pay up their arrears within the next few months, and as the Reserve Fund on the 30th September amounted to over £20,000, it was not thought necessary to stop any of the work at present being carried on by the Institute. The Governments in arrears are being asked to remit their contributions as soon as possible, and the General Secretary has been called upon to exercise the greatest economy possible in all branches of the expenditure. Progress, however, will continue to be made in the study of the questions which are being prepared for discussion at the next general assembly, such as the unification of the systems of collecting agricultural statistics, the collecting of statistics regarding milk and its principal products, visible and invisible stocks, the consumption and prices of meat, chemical manures, farming accounts, protection against locusts, and maritime freights for the conveyance of agricultural produce.

NEW ZEALAND AT PANAMA PACIFIC EXPOSITION.

REPORTING, under date of San Francisco, 12th April, on the ceremony of the dedication of the New Zealand Pavilion at the Panama Pacific Exposition Mr. E. Clifton, New Zealand Commissioner, writes, "On that occasion the chief officer of the Exposition, the representatives of the foreign participants, the British Consul-General, and many others in official positions were present, together with James Rolph, jun., the Mayor of San Francisco, who is also a partner in the firm of Hind, Rolph, and Co., the agents here for the Union Steamship Company of New Zealand. They appreciated the display that we have been privileged to put before the American public, and are all in agreement that it will have the undoubted effect of bringing very prominently to notice the primary products of our country with which we expect to extend our commercial relations."

AGRICULTURAL SHOW DATES.

Otago A. and P. Association.—Dunedin, 1st, 2nd, 3rd, and 4th June, 1915.

Waikato Winter Show Association.—Hamilton, 1st to 5th June, 1915.

Manawatu and West Coast A. and P. Association.—Palmerston North, 22nd, 23rd, 24th, and 25th June, 1915.

South Taranaki Winter Show.—Hawera, 30th June, 1st, 2nd, and 3rd July, 1915.

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.
January,	1915	137,816	296,439	45,622	339	138,081	85,123	87,393	..	..	2,860	683	..	1,209
„	*1914*	*231,766*	*464,185*	*30,424*	*33*	*150,492*	*136,086*	*108,742*	..	*500*	*2,851*	*15,234*	*4,306*	*11,133*
February,	1915	433,585	517,581	77,421	311	119,371	96,090	159,347	..	..	..	13,111	6,619	2,763
„	*1914*	*354,190*	*334,207*	*14,100*	*3*	*86,570*	*59,532*	*127,372*	..	*4*	..	*3,709*	*633*	*7,607*
March,	1915	80,439	203,480	30,176	..	55,280	51,811	49,809	..	..	..	8,410	185	274
„	*1914*	*446,522*	*551,313*	*36,689*	..	*61,060*	*62,732*	*95,175*	..	..	..	*8,187*	*2,562*	*3,958*
April,	1915	286,155	328,779	45,340	..	6,703	38,561	41,371	..	..	1,011	9,328	1,474	3,461
„	*1914*	*234,765*	*366,786*	*22,185*	..	*7,822*	*63,796*	*58,488*	..	*2,901*	..	*1,247*	*888*	*5,909*
May,	1914	336,632	638,397	39,315	54	837	37,776	43,364	3,623	11,062	..	8,355	2,112	9,316
„	*1913*	*418,221*	*731,520*	*22,073*	*100*	*637*	*46,304*	*33,281*	..	*265*	*2,000*	*15,751*	*5,005*	*9,057*
June,	1914	261,877	634,981	36,400	..	1,153	19,247	18,774	..	28,141	1,000	7,924	4,258	7,881
„	*1913*	*315,034*	*528,815*	*24,444*	*588*	*79*	*3,166*	*18,741*	..	..	*13,072*	*13,592*	*4,065*	*5,439*
July,	1914	225,411	239,143	38,170	..	1,355	2,003	15,868	..	1,425	1,000	5,810	2,584	8,053
„	*1913*	*215,713*	*331,353*	*14,030*	..	..	*1,687*	*17,169*	*5,651*	*300*	*9,190*	*9,682*	*1,720*	*10,793*
August,	1914	4,251	63,111	19,094	516	1,979	50	4,845	600	38,220	10,403	367	245	3,705
„	*1913*	*161,593*	*178,263*	*13,129*	*6*	*8*	*407*	*8,494*	*11,604*	*45*	*38,480*	*3,714*	*2,310*	*6,406*
September,	1914	3,386	49,200	2,353	..	15,885	..	3,337	..	5,896	7,288	1,143	57	..
„	*1913*	*133,122*	*83,521*	*5,334*	*16*	*6,575*	*2,020*	*7,176*	..	..	*16,336*	*3,826*	*1,501*	*10,049*
October,	1914	291,432	128,016	49,104	..	81,842	30,487	8,938	..	68,660	38,121	2,042	1,650	1,683
„	*1913*	*14,122*	*25,735*	*580*	..	*42,847*	*21,452*	*2,705*	..	..	*10,020*	*6,986*	*3,672*	*2,923*
November,	1914	136,346	27,577	48,302	27	98,729	70,048	37,604	15	24,289	35,783	885	110	1,377
„	*1913*	*20*	*1,479*	..	..	*53,468*	*23,722*	*1,891*	..	..	*2,478*	*4,162*	*771*	*2,314*
December,	1914	192,952	149,835	44,876	..	172,990	80,114	86,317	..	..	9,306	1,136	116	2,157
„	*1913*	*128,087*	*86,890*	*8,909*	..	*249,526*	*124,821*	*51,385*	..	*250*	*24,479*	*19,807*	*5,276*	*11,273*

HEMP AND TOW GRADING RETURNS.

APRIL.

Hemp.—The total number of bales graded was 9,633, as compared with 10,143 for the corresponding month of last year, a decrease of 510 bales. For the twelve months ending 30th April, 1915, the number of bales graded was 82,749, as compared with 151,772 for the previous twelve months, a decrease of 69,293 bales.

Tow.—During the month 2,740 bales were dealt with, as compared with 2,776 for the corresponding month of last year, a decrease of 36 bales. For the twelve months ending 30th April, 1915, the number of bales graded was 23,338, as compared with 48,759 for the previous twelve months, a decrease of 21,421 bales.

Stripper-slips.—During the month the number of bales graded was 153, as compared with 241 for the corresponding month of last year, a decrease of 88 bales. For the twelve months ending 30th April, 1915, the number of bales graded was 1,392.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF APRIL, 1915.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	7	213	1,003	299	11	3	3	1,539
Foxton ..	..	..	1,290	1,675	499	33	17	..	3,514
Napier	..	..	..	..	..	..	..	..	..
Wellington ..	..	136	698	2,181	358	64	16	..	3,453
Blenheim ..	..	107	97	15	11	..	..	..	230
Picton ..	..	71	149	18	..	..	..	..	238
Lyttelton ..	..	..	..	..	..	..	..	..	..
Bluff	..	..	117	390	..	1	..	..	508
Dunedin ..	..	..	112	39	..	..	..	..	151
Totals ..	..	321	2,676	5,321	1,167	109	36	3	9,633
Percentages of totals	..	3·33	27·77	55·23	12·11	1·13	0·37	0·03	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales
Auckland ..	..	229	268	20	517
Foxton ..	198	488	33	2	721
Napier	..	..	..	..	..
Wellington ..	177	500	54	17	748
Blenheim ..	3	141	9	..	153
Picton	..	93	12	..	105
Lyttelton ..	240	..	..	..	240
Bluff	27	39	160	7	233
Dunedin ..	9	14	..	..	23
Totals ..	654	1,504	536	46	2,740

Stripper-slips.—Foxton: Second grade, 102. Wellington: First grade, 51.

NEW ZEALAND-SAN FRANCISCO TRADE.

FOLLOWING are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver from New Zealand, since December last:—

—	"Marama," 7th Jan.	"Maitai," 4th Feb.	"Moana," 4th March.	"Marama," 1st April.	"Maitai," 30th April.
Gum, packages	..	30	31	13	49
Milk, cases	..	1,000	..	9	..
Grain, &c., sacks	36	10	30	34	47
Meat, cases	82	..	..	61	55
Onions, cases	9	11	..	36	17
Potatoes, sacks	26	30	..	42	32
Sundries, packages	287	435	4	17	498
Butter, boxes	180	..	7	9	2
Hemp, bales	..	..	..	..	..
Frozen lamb, carcases	2,202	..	3	..	3
Hides and skins, sacks and bales	145	2	..	..	..
Beef, quarters—pieces	20	..	7	8	..
Veal, carcases	26	..	200	..	..
Cheese, crates	154	..	..	9	..
Sheep-skins, bales	48	15	..	16	9

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since November last:—

—	"Makura," 29th Dec.	"Niagara," 26th Jan.	"Makura," 22nd Feb.	"Niagara," 26th March.	"Makura," 20th April.
Butter, boxes	2,350	9,159	8,175	9,030	4,875
Mutton, carcases	..	1,041	78	..	..
Lamb, ,,	..	444	175	..	..
Beef, quarters—pieces	..	247	221	..	..
Veal, carcases	..	10	23	..	..
Frozen sundries, packages	..	17	22	..	..
Wool, bales	165	109	210	1,198	531
Grass-seeds, beans, &c., sacks	..	22	..	..	261
Hides and skins, sacks, &c.	1,984	1,368	1,277	996	702
Onions, cases	..	60	1,333	2,000	200
Sheep-skins, bales	501	230	136	96	186
Jam, cases	..	..	..	..	..
Sundries, packages	53	210	..	22	36
Pelts, casks	28	45	83	40	30
Kauri-gum, packages	89	..	..	53	360
Hemp, bales	..	340	264	250	97
Rabbits, crates	..	..	..	..	..
Timber, pieces	..	..	..	..	..
Eggs, cases and crates	..	..	..	..	..
Meats (canned, &c.), cases	..	..	..	..	..
Cheese, crates	..	..	..	..	..
Fresh fruit, cases	..	..	..	985	1,610

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of April, 1915 :—

Port of Shipment.	Horses.			Cattle.		Sheep.			Pigs.		Dogs.		
	To Australia.	To Pacific Islands.	To Montevideo.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To South America.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To United Kingdom.
Auckland ..	5	4	..	..	28	..	233	..	..	57	1	5	..
Napier ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington	2	..	..	..	..	..	..	..	..	..	5	..	..
Lyttelton ..	10*	..	..	..	..	15	..	..	..	..	9*	..	..
Bluff ..	1	..	..	..	..	85	..	..	..	..	2	..	..
Totals ..	18	4	..	..	28	100	233	..	..	57	17	5	..

* Circus animals returning to Australia.

The following are the particulars of the horses exported: Geldings, 2; medium draught, 4; ponies, 1; thoroughbreds, 5.

Auckland also exported 13 crates of poultry to the Pacific islands.

STOCK IN QUARANTINE.

THE following stock was received into quarantine during the month of April, 1915 :—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			MOTUIHI ISLAND (AUCKLAND).		
1	Fox terrier ..	Male ..	London ..	G. R. Hutchinson	Auckland.
2	Jersey heifers ..	Female	,, ..	A. Buckland and Sons	,,
			SOMES ISLAND, WELLINGTON.		
1	Fox terrier ..	Female	London ..	John Prentice ..	Palmerston N.
1	Collie	Male ..	,, ..	W. H. Gainsford ..	Urengi, Dannevirke.
2	Fox hounds ..	Male and female	,, ..	T. F. Hayhurst ..	Waikato.
4	Roscommon rams	Male ..	,, ..	J. Davies (Murray, Roberts, and Co., agents).	..
7	Thoroughbreds	Female	Sydney ..	Mr. Nester ..	Pier Hotel, Wellington.
			QUAIL ISLAND, LYTTELTON.		
			Nil.		